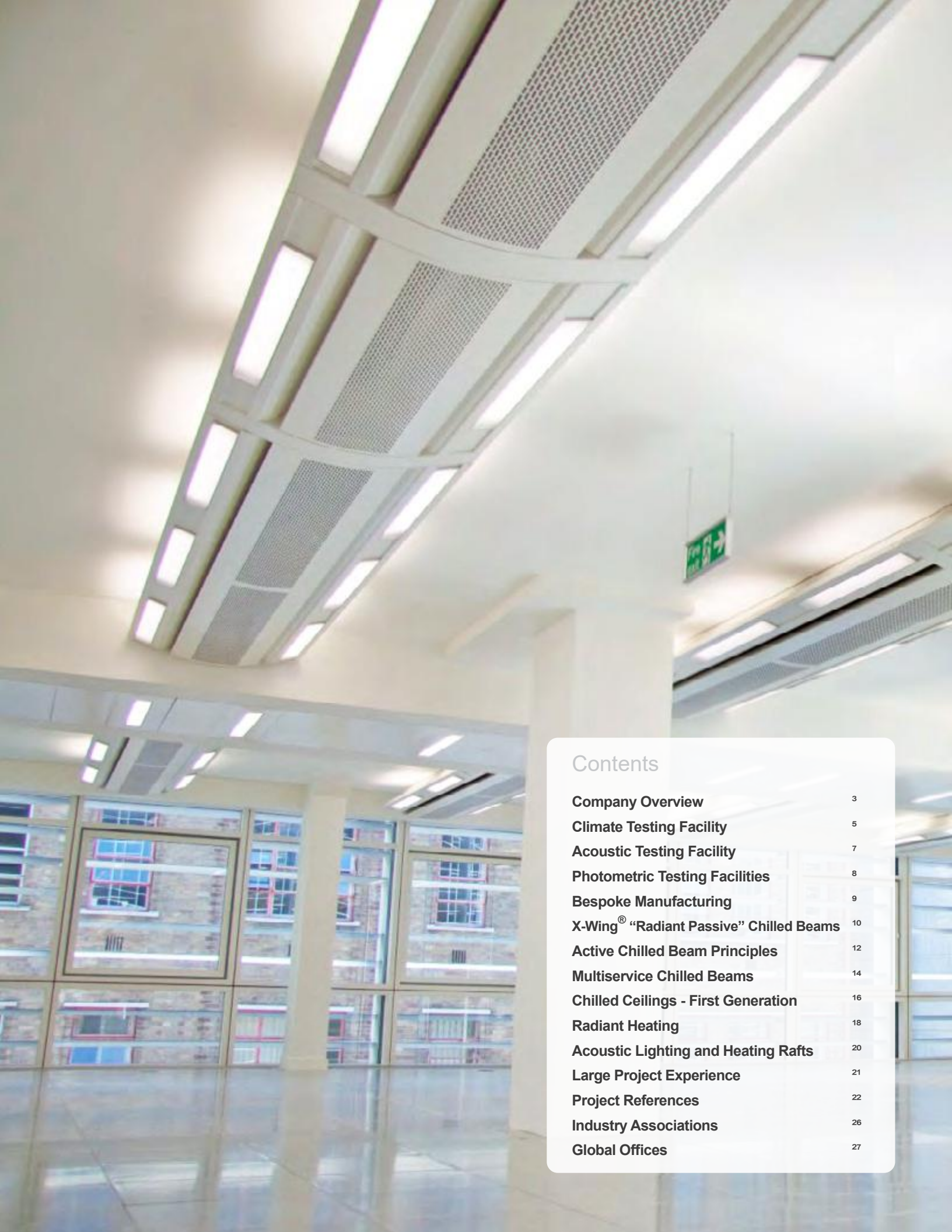
*the future of space conditioning*

# Company Profile



www.FTFgroup.us

FTF GROUP®
Climate



## Contents

# Company Overview

Frenger Systems is a wholly owned subsidiary of the FTF Group and is trading with the United States of America as FTF Group Climate. Frenger Systems is a renowned specialist manufacturer of space conditioning products for indoor climate / environments. Frenger has extensive experience dating back some 80 years and is at the forefront of the design, development and manufacture of water driven cooling and heating technologies. Over the years Frenger has earned an enviable reputation as a dependable supply partner capable of developing effective space conditioning solutions for the most complex of projects.

In 1962 Frenger designed, supplied and installed the “World’s Largest Radiant Chilled Ceiling” system which was revolutionary at the time. This consisted of 1.88 million square foot of radiant chilled ceiling over the 27 storeys of the Shell Oil headquarters, situated on the river Thames in London, UK. The Thames water was used via secondary heat exchangers to cool the water that circulated on a closed circuit around the ceilings within the building. This building was also the first fully sealed air conditioned building in Europe. This installation is still operating after some 50 years and is a testament to the integrity of the product and to Frenger’s design capabilities.

Frenger also pioneered with the supply of Chilled Beam and ceiling technology to Australia in 2003 and was for the first ever building to be awarded a 5 star energy rating. The building was called “The Bond”, situated in Sydney and developed by Bovis Lend Lease (BLL); whom are now known as Lend Lease.

BLL spent considerable time researching Chilled Beam and ceiling Technology worldwide and undertook a great amount of due diligence before selecting a Chilled Beam supplier for their then highly confidential building (“The Bond”, 30 Hickson Road, Sydney). Many of BLL’s competition thought that it was not possible to gain a 5 star energy rating and as such BLL knew that the stakes were extremely high and much depended upon their success. Frenger were then chosen by BLL to play an integral part of what transpired to be a successful process and the building is still, some 10 years later, functioning well and coping with external temperatures in the region of 104°F for some parts of the year.

Since 2003 Frenger has supplied Chilled Beam technology to many 5 star and even 6 star energy rated buildings more recently in Australasia, some of these can be seen on pages 23 to 25 of this Company Profile under the title of “Project References”.

In addition to Frenger providing the first Chilled Ceiling in 1962 and providing the first ever 5 star energy rated building in 2003, Frenger pioneered with Multi Service Chilled Beams (“MSCB’s”) in the UK and having designed, supplied and often installed many successful MSCB projects. Frenger were selected by Blyth and Blyth for the £160 Million Pound (Circa $250 Million US Dollars) refurbishment of London & Regionals “55 Baker Street” building which involved HBG Construction (now known as BAM Construction) amalgamating 3 separate buildings into one enormous building with 2 central atriums and two internal streets.


Frenger designed, Climactic Tested (full scale laboratory mock up), manufactured and installed these MSCB's in 2007 which represented circa £7 million GBP (Circa $10.8 million US Dollars) order value to Frenger. This was and still is the world's largest MSCB installation. HBG's annual award for Best Sub-Contractor was also awarded to Frenger and Frenger also gained various letters of commendation from the Client, the Consulting Engineers and the Main Contractor regards their performance of their involvement with the £160 million GBP (Circa $250 million US Dollars) refurbishment project. Details of this and other major projects by Frenger can be found on page 22 of this Company Profile under the heading "Large Project experience".

The reason as to why Frenger are chosen for such important high profile and complex projects for the space conditioning / indoor climate is because Frenger:

- Have the highest performing products on the market.
- Excellent product quality.
- Always deliver on what is promised and never over state / over sell.
- Have everything in-house to substantiate all aspects of the indoor environment.
- Manufacture as many key items in-house as possible to keep full control.
- Take ownership to deliver what is required, on time, on budget and to the correct specification.

Frenger employs professionally qualified Mechanical Engineers, Electrical Engineers, Lighting Designers, Building Services Engineers and Project Managers to give customers an unrivalled level of in house expertise for Chilled Beam and Multiservice Chilled Beam (MSCB) technologies. Frenger builds sound business relationships with clients and has won many accolades to this extent, which has warranted Frenger a justifiable reputation for delivering complex projects on time, within budget and to specification, every time. All aspects of the business are accredited to BS EN ISO9001:2008 and are regularly audited by the British Standards Institution (BSI).

Due to Frenger's continuing success, the shareholders of its parent company, the FTF Group, provided Frenger in 2009 with one of their fully owned outright multi million GBP buildings for fit out as a new UK Technical Facility. The building is situated in the East Midlands and holds a prominent position on the prestigious Pride Park corporate business centre. Frenger have equipped this building to support all technical aspects of the companies' world wide operations.

The new headquarters are fully space conditioned with various different types of Chilled Beam, MSCB and Chilled Ceiling technologies, each controlled by a full building management system (BMS) which can demonstrate exactly how well each chilled system is functioning and their efficiencies. This building also houses Frenger's:

- Specialist manufacturing
- State-of-the-art Climatic Test facilities
- Photometric test laboratories
- Acoustic laboratory
- Lighting design capabilities
- 2D & 3D CAD operations
- Computational fluid dynamics
- Solidworks.

# Climate Testing Facility

The FTF Group has 3 number climatic test laboratories located at it's technical centre which is located at the prestigious Pride Park, Derby, England.

These purpose designed and built laboratories have nominal internal dimensions of 20.7 ft (L) x 18.7 ft (W) x 10.8 ft (H) and each environmental chamber includes it's own thermal wall so that both core and perimeter zones can be physically modelled in any of the rigs.

All 3 environmental chambers are fixed in size however the fitment of partition walling and false ceilings can be positioned to match the physical constraints of a project specific installation.

[1] of [3] Climatic Test Laboratories

## Catalogue Data - Standard Product

All FTF Group's products are designed by FTF Group's in-house Research and Development (R & D) department. Once any new product is ready for mass production these are tested in-house to the following British Standards for Catalogue Data to be collated / published:

- BS EN 14240:2004 – Ventilation for buildings – Chilled ceilings – Testing and rating.
- BS EN 14518:2005 – Ventilation for buildings – Chilled beams – Testing and rating of passive chilled beams.
- BS EN 15116:2008 – Ventilation in buildings – Chilled beams – Testing and rating of active chilled beams.
- BS EN 14037-2 – Radiant Panel Test Methods for Thermal Output.
- ISO 7730 – Ergonomics of the indoor environment.
- ASHRAE 55-2010 – Thermal Environmental conditions for human occupancy.

In addition to the above in-house comprehensive testing which utilises state of the art equipment and BSRIA calibrated instrumentation to reduce the amount of uncertainty to an accuracy of + / - 2.5%, The FTF Group(s) subsidiary also subscribe to third partly Validation Testing by Eurovent.

Eurovent certification testing is only for performance and takes no account of the indoor environment, whereas all FTF Group testing and published catalogue data is compliant to ISO 7730, ergonomics of the indoor environment and ASHRAE 55-2010, thermal environmental conditions for human occupancy to ensure that occupancy comfort is maintained to the highest of standards.

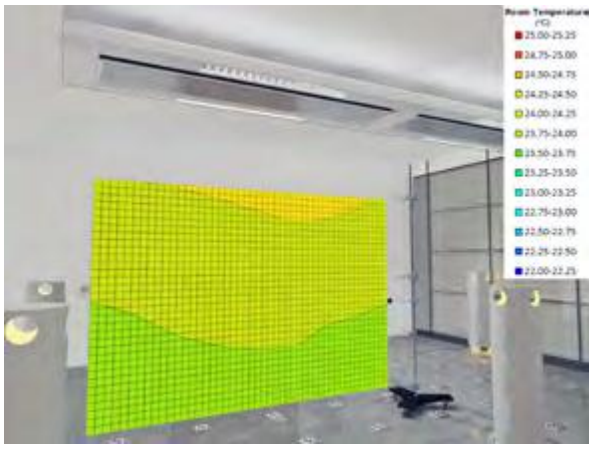
Project specific mock-up testing is a valuable tool which allows the Client to fully asses the proposed system and determine the resulting indoor quality and comfort conditions; the physical modeling is achieved by installing a full scale representation of a building zone complete with internal & external heat gains (Lighting, Small Power, Occupancy & Solar Gains).

The installed mock-up enables the client to verify the following:

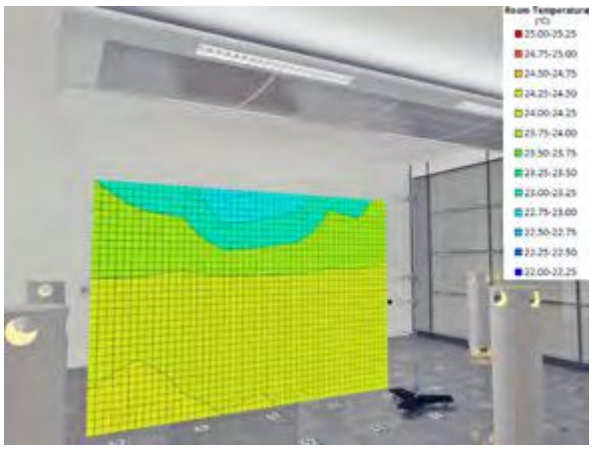
- Product performance under project specific conditions
- Spatial air temperature distribution
- Spatial air velocities
- Experience thermal comfort
- Project specific aesthetics
- Experience lighting levels (where relevant)
- Investigate the specific design and allow the system to be enhanced.

The project-specific installation and test is normally conducted to verify:

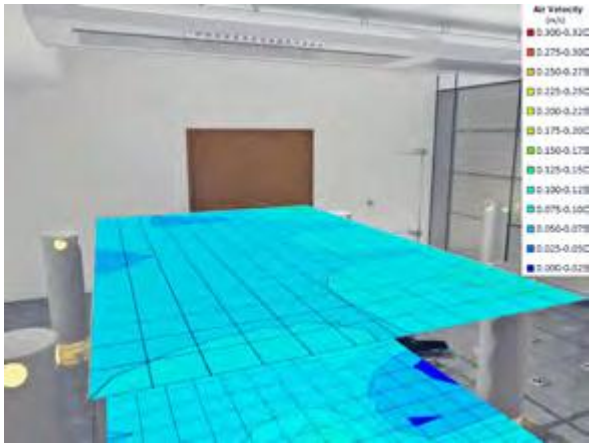
- Product capacity under design conditions
- Comfort levels
  - Air temperature distribution
  - Thermal stratification
  - Draft risk
  - Radiant temperature analysis
- Smoke test video illustrating air movement



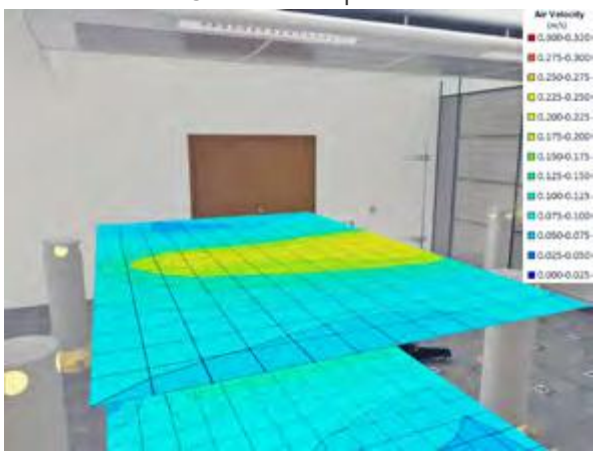
Active MSCB Room Temperature



Radiant Passive MSCB Room Temperature



Active MSCB Air Velocity



Radiant Passive MSCB Air Velocity

# Acoustic Testing Facility

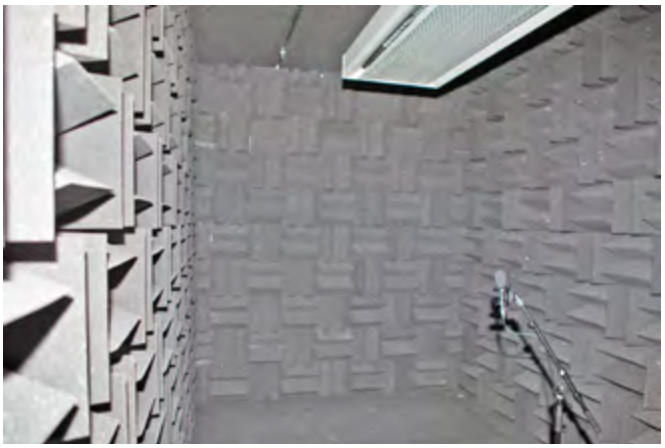
The Acoustic Test Room at FTF Group's Technical Facility is a hemi-anechoic chamber which utilises sound absorbing acoustic foam material in the shape of wedges to provide an echo free zone for acoustic measurement; the height of the acoustic foam wedges has a direct relationship with the maximum absorption frequency, hence FTF Group had the wedges specifically designed to optimise the sound absorption at the peak frequency normally found with our active chilled beam products.

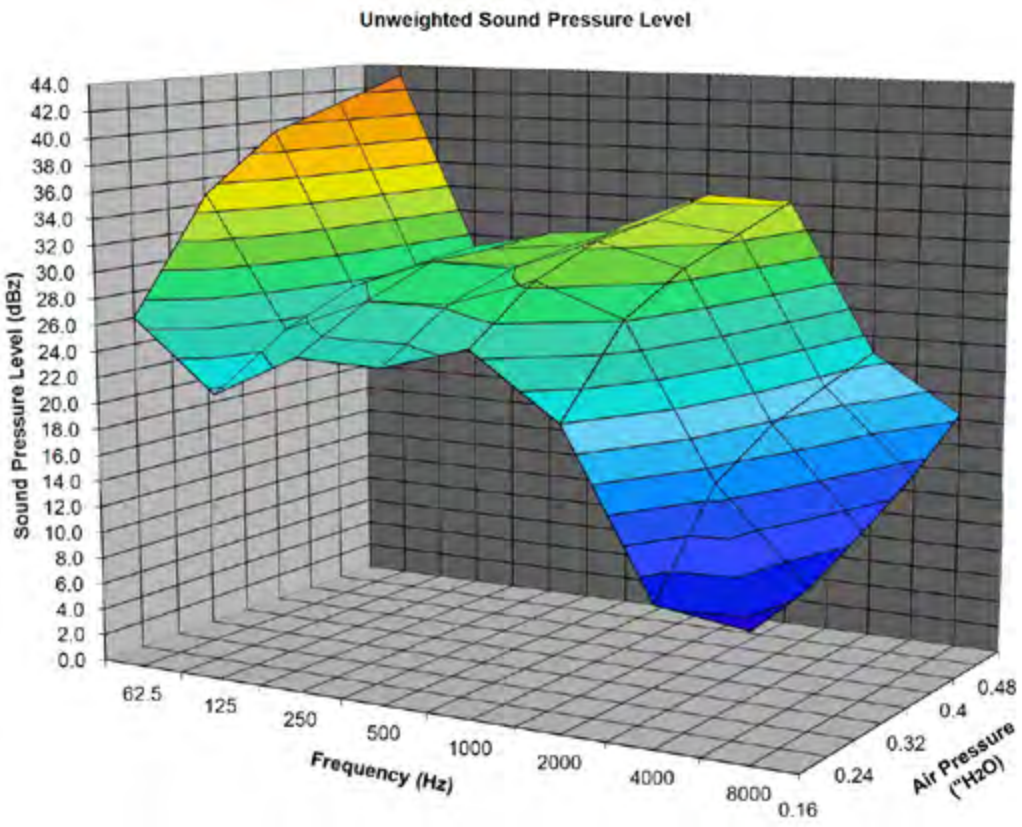
The use of acoustic absorbing material within the test room provides the simulation of a quiet open space without "reflections" which helps to ensure sound measurements from the sound source are accurate, in addition the acoustic material also helps reduce external noise entering the test room meaning that relatively low levels of sound can be accurately measured.

The acoustic facilities allow FTF Group to provide express in-house sound evaluation so that all products, even project specific designs can be assessed and optimised.

To ensure accuracy FTF Group only use Class 1 measurement equipment which allows sound level measurements to be taken at 11 different octave bands between 16 Hz to 16 kHz, with A, C and Z (un-weighted) simultaneous weightings.

In addition to the above, FTF Group also send their new products for specialist third party Acoustic Testing. The results of which are very close and within measurement tolerances to that of FTF Group's in-house measurement of sound.





# Photometric Testing Facilities

The Photometric test laboratories at FTF Group are used to evaluate the performance of luminaires. To measure the performance, it is necessary to obtain values of light intensity distribution from the luminaire. These light intensity distributions are used to mathematically model the lighting distribution envelope of a particular luminaire. This distribution along with the luminaires efficacy allows for the generation of a digital distribution that is the basis of the usual industry standard electronic file format. In order to assess the efficacy of the luminaire it is a requirement to compare the performance of the luminaire against either a calibrated light source for absolute output or against the “bare” light source for a relative performance ratio.

The industry uses both methods. Generally absolute lumen outputs are used for solid state lighting sources and relative lighting output ratios (LOR) are used for the more traditional sources. Where the LOR method is chosen then published Lamp manufacturer’s data is used to calculate actual lighting levels in a design.

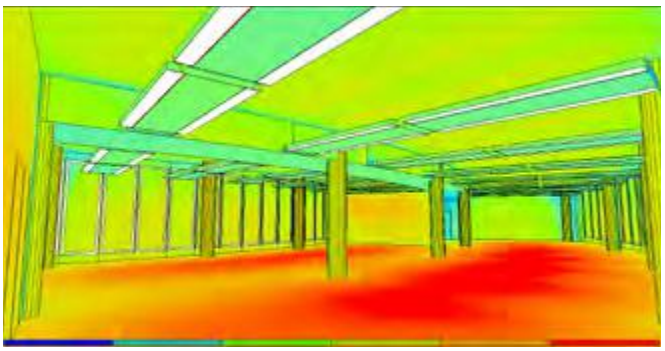
The intensity distribution is obtained by the use of a Goniophotometer to measure the intensity of light emitted from the surface of the fitting at pre-determined angles. The light intensity is measured using either a photometer with a corrective spectral response filter to match the CIE standard observer curves or our spectrometer for LED sources.

Luminaire outputs are measured using our integrating sphere for smaller luminaires or our large integrator room for large fittings and Multi Service Chilled Beams. For both methods we can use traceable calibrated radiant flux standards for absolute comparisons.

All tests use appropriate equipment to measure and control the characteristics of the luminaire and include air temperature measurements, luminaire supply voltage, luminaire current and power. Thermal characteristics of luminaire components can be recorded during the testing process as required.

A full test report is compiled and supplied in “locked” PDF format. Data is collected and correlated using applicable software and is presented electronically to suit, usually in Eulumdat, CIBSE TM14 or IESN standard file format.

FTF Group conduct photometric tests in accordance with CIE 127:2007 and BS EN 13032-1 and sound engineering practice as applicable. During the course of these tests suitable temperature measurements of parts of LEDs can be recorded. These recorded and plotted temperature distributions can be used to provide feedback and help optimise the light output of solid state light source based luminaires which are often found to be sensitive to junction temperatures.



# Bespoke Manufacturing

The Company has the manufacturing capability required to deliver the most complex of bespoke solutions. Facilities include the latest full CNC bending centers and machining equipment, together with a dedicated powder-coat paint plant to paint all of the components of the multiservice chilled beam.















# X-Wing® “Radiant Passive” Chilled Beams

FTF Group has extensive experience in the design and manufacture of “Radiant” / Convective Passive Chilled Beam solutions; providing discreet and cost-effective space conditioning to commercial, educational and healthcare environments. Over the past 20 years products have been supplied to major projects throughout Europe, and as far afield as Australia. FTF Group’s “Radiant” / Convective Passive Chilled Beams offer a hybrid between conventional passive chilled beams and radiant chilled ceilings.

## Low maintenance cooling systems

“Radiant” / Convective Passive Chilled Beams provide an efficient means of cooling and, with no moving parts, require little maintenance. This in turn ensures lower running costs. They can be installed above perforated or microperforated metal ceilings to provide up to 43 BTU/hr/ft of cost-effective cooling with minimal control requirements.

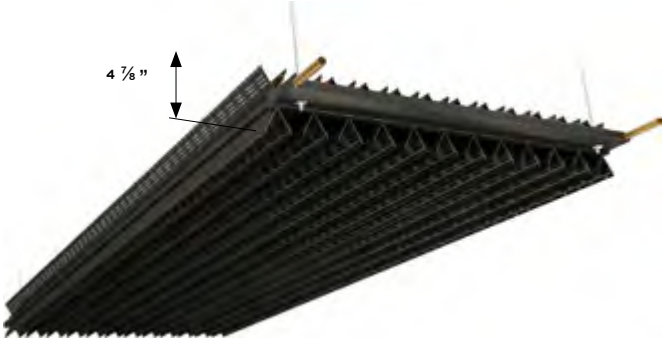
This type of solution does not create any noise or drafts in office environments, and improve both the comfort and is reported to increase the productivity of the occupants. The system ensures a very low degree of air movement below the chilled beams in order to comply with ASHRAE 55-2010 standard of 40 fpm and ISO 7730 standard of less than 50 fpm.

## Operation

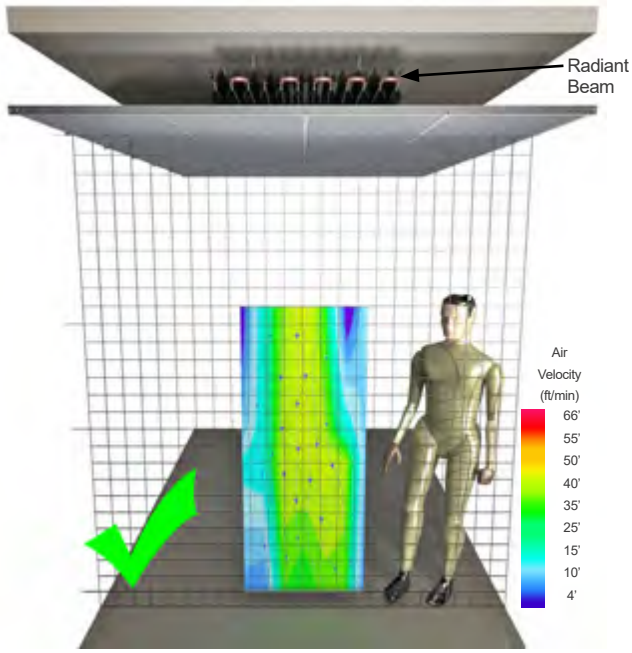
When cold water passes through our “Radiant” / Convective Passive Chilled Beam the warm room air is cooled against the surfaces. This chilled air, which then becomes heavier, then streams through the punched louvres in the radiant beam and percolates through the small ceiling perforations into space below (when concealed). In this way air is circulated within the room, with warm air from the room space being continually replaced by cooled air.

In addition to this convective process, the cold surfaces of the beam also absorb heat radiation from the building occupants and the warmer surrounding surfaces. The radiant quotient is approximately 40% of the total cooling effect (the other 60% of cooling being generated by the convective cooling effect described above). The ability of our “Radiant” / Convective Passive Chilled Beam to also cool by radiant absorption means that, when compared to a finned tube battery, our beam can deliver 40% more cooling without any additional risk of draft.

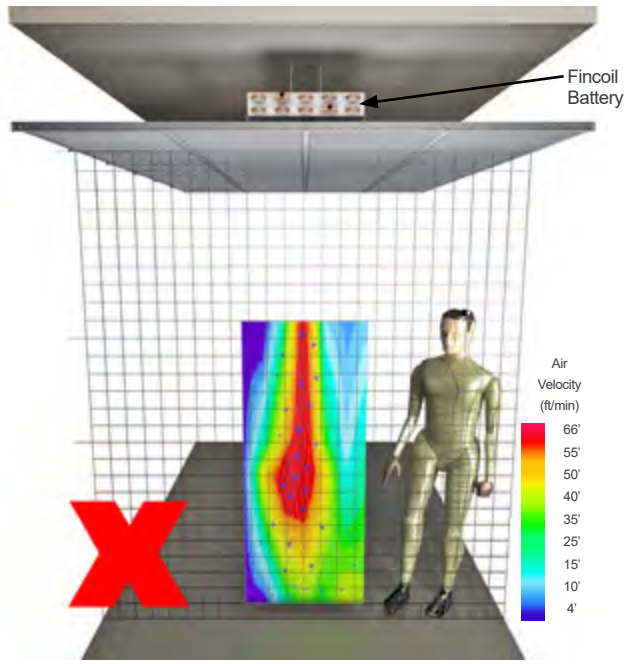
In addition to the convective heat transfer common to all passive chilled beams, the radiant effect of the products also cools the metal ceiling system(secondary radiation), which in turn re-radiates this cooling effect into the room. The radiant effect of the beam also provides a more comfortable environment for the building occupants and even less chance of any drafts (draft risk rating is reduced). The system provides the comfort and aesthetic benefits of radiant chilled ceilings at a significantly lower cost and whilst maintaining the higher cooling capacities associated with chilled beam installations.




X-Wing® (Radiant Chilled Beam)




Radiant Chilled Beam




Convective Only Fincoil Battery

## Composition and Manufacture

FTF Group's "Radiant" / Convective Passive Chilled Beams are constructed from coiled copper which is formed into serpentine coils utilising full CNC, state-of-the-art automated decoiling and bending machines. This process eliminates the risk of any leaks as there are no joints in the copper water circuit of the product. The aluminum radiant "wings" which make up the cooling surface are mechanically fixed around the copper tube serpentine one piece coil in which the cold water is transported to provide 100% encapsulation of the waterways for optimum transfer of energy from the radiant wings to the copper waterways. Both the copper tubing and aluminum wings are 100% recyclable.

## Dimensions

FTF Group "Radiant" / Convective Passive Chilled Beams are compact and versatile in the way that they can be mounted and located. Available in different widths and lengths and is less than 5" deep, systems can be installed in 10" ceiling voids.

## Benefits of "Radiant" / Convective Chilled Beams

- No joints in the copper tube coil - no risk of leaks
- No noise or drafts; improved occupancy comfort and productivity
- No moving parts equates to reduced maintenance costs
- Capital costs now comparable and / or more competitive than traditional AC systems
- Improved efficiencies translates to lower running costs
- Can be installed within shallow ceiling voids

## FTF Group's unique features

- Less than 5" deep
- Offers radiant and convective cooling
- Will operate efficiently above a micro-perforated ceiling
- Can be installed within a 10" deep total ceiling construction, if necesary due to height restrictions
- Minimal maintenance due to absence of closely spaced fins as associated with fincoil battery passive beams
- Very low air movement below chilled beam
- Cooling capacity up to 43 BTU/hr/ft above metal ceiling perfo rated to 28% free area and 0.094" or 0.118" perforation.

## Commercial Offices

FTF Group's range of "Radiant" / Convective Passive Chilled Beams installed above perforated metal ceiling systems is a tried and tested solution used in many high-profile projects in the UK, Europe and Australia. The system provides high levels of comfort for occupants, with minimal control and maintenance requirements.

Furthermore, the Radiant / Convective nature of the product means that it is insensitive to the position of heat sources, and can be utilised with standard ceiling perforation patterns for greatly improved aesthetics.

## Maintenance

FTF Group's range of "Radiant" / Convective Passive Chilled Beams are extremely easy to clean, requiring a simple wipe with a damp cloth.

# Active Chilled Beam Principles

FTF Group manufactures and supplies a range of active chilled beams with the highest performance curves on the market. FTF Group draw upon high performance technologies and patented / registered design features to deliver efficient cooling to commercial, educational and healthcare environments.

## Efficient and quiet space conditioning

FTF Group's patented battery angles, air chamber geometry and unique burst nozzle strip enables their Active Chilled Beams to deliver unrivalled levels of cooling capacity with a given air volume whilst ensuring that the reconditioned air is delivered into the space in a controlled manner that best suits the application. The units are so efficient that they can provide cooling in excess of 73 BTU/hr/ft with fresh air supply of as little as 0.2 CFM/ft².

Units are designed to integrate into suspended ceiling systems. They fit easily into the most common ceiling designs and have removable underplates that can be perforated to match perforated metal ceilings where required or to best compliment mineral fibre or plasterboard ceilings. These removable underplates provide access for maintenance, although maintenance is minimal given that there are no moving parts.

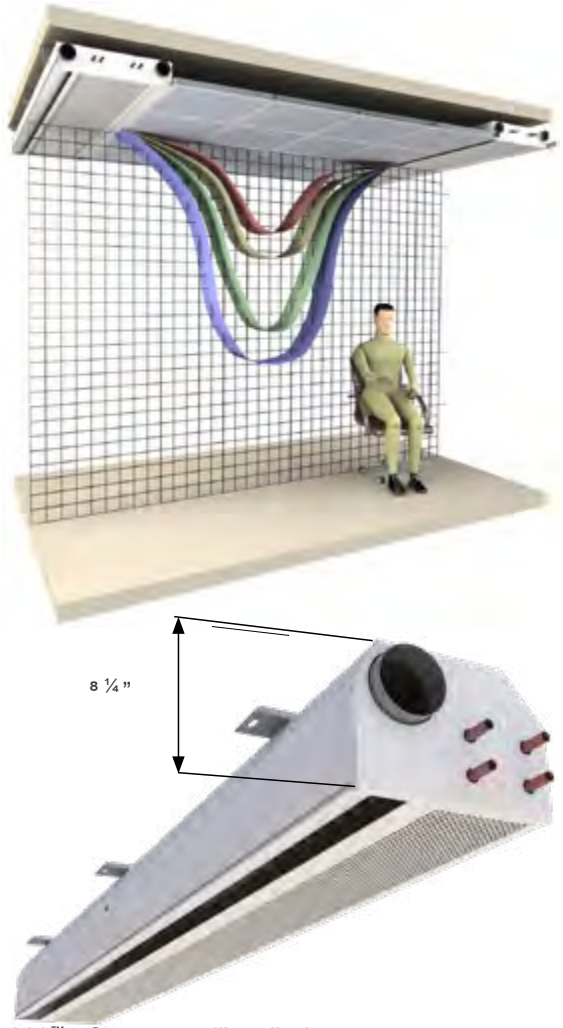
FTF Group's Active Beams are also designed to ensure low noise levels. They incorporate a patented air chamber burst nozzle strip technology which delivers cool air to the room very quietly, and makes them suitable for discreet installation in hotels, offices, hospitals, schools and banks. Air delivery can be accurately controlled so that air velocities do not exceed 40 fpm, ensuring compliance with ASHRAE 55-2010 and 50 fpm for ISO 7730 compliance by use of discrete air deflector vanes mounted as part of the patented and registered designed air chambers. Beams can be supplied with factory fitted condensation sensors.

## Operation

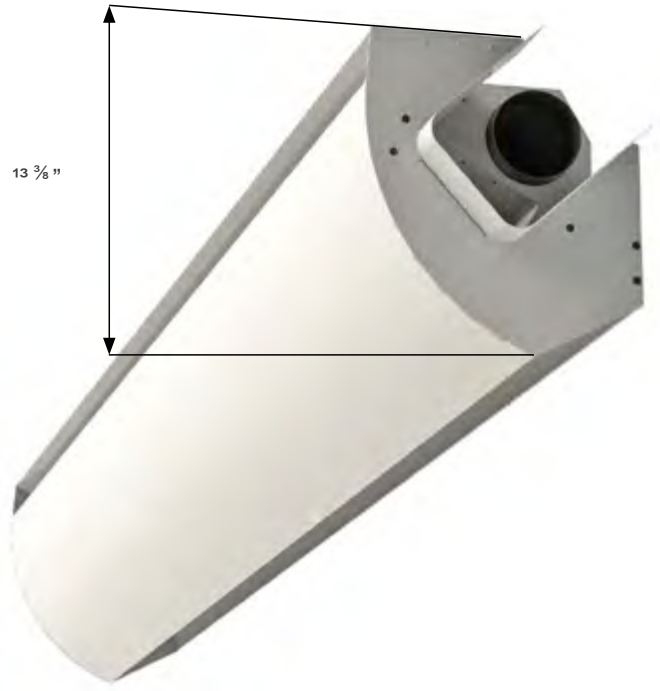
An active chilled beam is essentially a water-driven, ceiling-mounted induction unit. It uses a supply of fresh ventilation air to induce warm room air (recirculated air) through the unit's cooling fincoil battery. The FTF Group beam is able to induce and condition 4-5 times as much room air as fresh air supplied. Conditioned air is then quietly reintroduced into the room, entraining to the ceiling rather than being jetted out directly below the beam, thanks to patented air chamber design that produces a Coanda effect. The patented nozzle technology also allows the Company to determine and factory-set the airflow dispersion characteristics of each unit. Beams can deliver a cooling capacity in excess of 3142 BTU/hr.

## Composition and manufacture

Air is cooled as it passes through a fin coil battery, which comprises aluminum fins with copper tubes through which water passes. The heat of the room is taken in through the aluminum fins, and transferred into the water circuit through the copper tube and transported away via the circulating chilled water back to a central chiller unit. Active chilled beams have no moving parts, and as such maintenance costs are minimal.




Ultima 300™ - One way ceiling discharge




Cornice™ One way ceiling discharge

## Dimensions

The FTF Group units have side-mounted air chambers that facilitate high cooling in very compact dimensions. Our slim line beams range which can operate with up to 106 CFM and is just 5.2” deep, whereas our High Output beam range which can operate with up to 169.6 CFM and is just 81/4” deep. Both of which can achieve 3142 BTU/hr total cooling.

## Benefits of active chilled beams

- Units can deliver cooling, heating, fresh air and lighting
- A range of beams with 1-way, 2-way and 360 Degree air discharge
- No moving parts equates to reduced maintenance costs
- Capital costs now comparable and / or less than traditional air conditioning systems
- Improved efficiencies translate to lower running costs
- Can be installed in shallow ceiling voids
- Units can deliver cooling capacities in excess of 58 BTU/hr/ft

## FTF Group’s unique features

- All recirculated air is induced through the removable underplate and consequently there is no need for a return air path via the ceiling void
- Advanced Patented battery angle technology delivers induction ratios of 5:1, enabling effective cooling at supply air rates as low as 0.2 CFM/ft²
- Patented burst nozzle strips design result in quiet operation
- Advanced air chamber design creates a Coanda effect, with air entraining to the ceiling for improved occupancy comfort levels
- Registered designs for concealed air discharge vanes provide “fan shaped distribution” technology as standard which reduces the risk of high air speeds in the occupied zone providing higher levels of thermal comfort
- Air delivery can be accurately controlled such that velocities do not exceed 40 fpm to ensure compliance to ASHRAE 55-2010 and 50 fpm for the European Standard ISO 7730

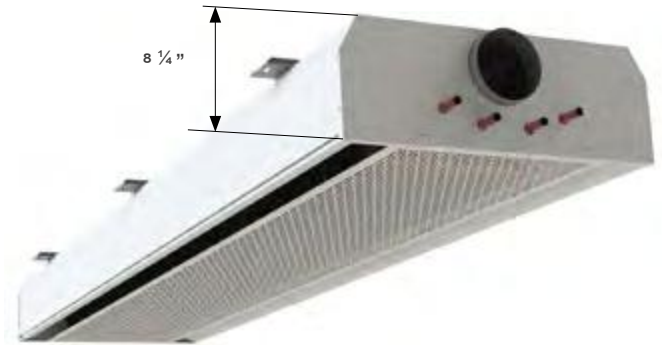
## Air Distribution

FTF Group’s range of Active Chilled Beams have been specifically designed to deliver air into the space in a controlled and predictable manner. All beams create a Coanda effect in the unit which encourages the supplied air to entrain to the ceiling or soffit, furthermore, units can be manufactured with varying throw characteristics (short, medium or long) and even with different air delivery characteristics from either side of the unit, or at one end of a unit if required.

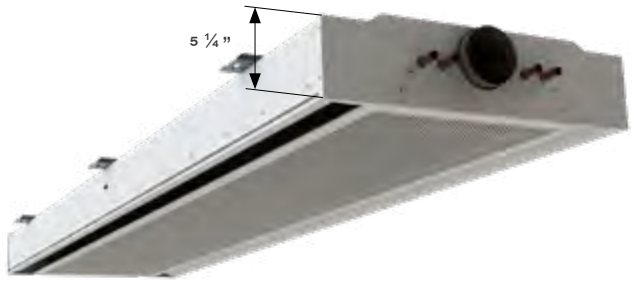
Air distribution and comfort levels are determined by many factors; supply air temperature, air volume, air pressure, air direction and entrainment (Coanda effect) and beam spacing. Extensive laboratory tests have been undertaken by FTF Group in their inhouse state-of-the-art climatic test laboratories, to develop a library of empirical data presented in the form of scatter diagrams, which enables the designer to select the most appropriate product configuration for any given condition.

## Maintenance

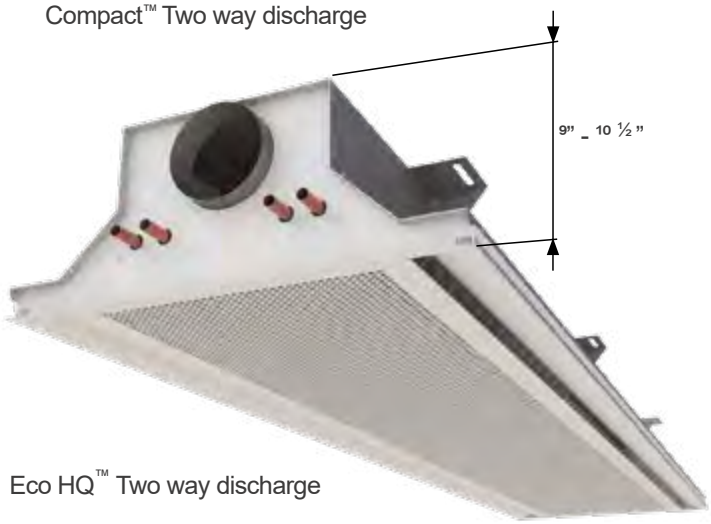
All units are provided with simple access to the cooling battery through the removable underplate - there is no requirement to access the ceiling void for maintenance or cleaning.




Ultima™ Two way discharge




Compact™ Two way discharge




Eco HQ™ Two way discharge


Halo™ 360 degree discharge pattern

# Multiservice Chilled Beams

FTF Group manufactures and supplies multiservice chilled beams (MSCBs). These integrated building services units provide flexible space conditioning that can be tailored in terms of appearance and the services provided, in order to meet project specific requirements. In this way they help to create attractive, comfortable and productive working environments.

## Flexible building service units

A full range of building services can be incorporated within a FTF Group multiservice chilled beam, including:

- Cooling & heating
- Fresh air supply
- Uplighting, downlighting and emergency lighting
- BMS sensors, control valves & condensation detectors
- Accommodate fire alarms and sprinkler systems
- Acoustic insulation
- Pipework, ductwork & compartmental trunking
- Accommodate PA and VA speaker systems

Bringing several services together in an integrated MSCB unit means that the physical dimensions of the unit can be optimised to enable use in spaces where the floor-to-slab height is minimal. The concept also provides the specifier with a single source of responsibility for the design, supply and integration of all services “pre fabricated” offsite in a controlled environment, reducing costs and on-site time.

## Operation

MSCB’s can utilise either “Radiant” passive or Active chilled beam technologies. The cooling units are integrated into perforated architectural casings with either central or side-mounted lighting. Lighting options are varied and could be direct, indirect, a combination direct and indirect,T5 fluorescent, LED’s or continous extruded lighting optics of any shape and size to suit the architectural aspirations of the project. Completed MSCB’s are factory tested and delivered to site for “plug and play” mechanical and electrical connection / installation.

FTF Group’s passive MSCB utilise the company’s “Radiant”/ Convective products to provide comfortable cooling through a combination of convective and radiant heat transfer processes; warm room air is cooled through contact with the chilled beam and diffused into the space through the perforated underplate, the beam casing is also cooled via secondary radiation and thus absorbing heat from the warmer occupants. This type of passive cooling provides the best possible combination of high cooling capacities and exception levels of occupancy comfort with minimal maintenance.

Where there is a need to use the MSCB to deliver fresh air into the space, then FTF Group’s Slim Line or High Output Active beam products will form the basis for the company’s active MSCB’s. Active beams utilise the delivery of supply air to induce warmer room air through the unit’s cooling battery. The technology employed in FTF Group’s active chilled beams ensures high cooling capacity with low supply air volumes, coupled with a quiet and controlled delivery of air for optimal comfort.

Both types of MSCB are designed for simple installation; electrical, water and air connections can be inter-linked from unit to unit by simple “Plug and Play” connections to reduce on-site time to a minimum.

Active MSCB

Radiant Passive MSCB

Radiant Passive MSCB

Active MSCB

## Finish and appearance

MSCB's offer an alternative to the monolithic ceilings that have become commonplace in office developments, providing attractive yet functional building services installations. The appearance of each beam can be customised in terms of shape, dimensions, lighting options, colour and perforation pattern to meet the client's particular requirements.

## Technical Support

FTF Group can draw upon many years experience in the design and manufacture of cooling systems which combine the highest levels of occupancy comfort with class-leading design. FTF Group has inhouse specialist manufacturing, state-of-the-art test facilities and various design operations for all aspects of every service within their MSCB units.

FTF Group can offer clients a range of support services;

- Climate simulations to predict comfort levels
- Full lighting design including light level calculations and luminaire development to LG3/LG7 requirements
- CAD drafting and 3D rendering of MSCBs in the environment
- Solidworks
- CFD Modeling
- Energy Modeling
- BIM Software
- Revit

## Benefits of MSCB's

- Ideal where floor-to-slab height is minimal
- Low running costs with minimal maintenance requirements
- Integration of several services in a single unit reduces costs and site programme requirements ("pre fabricated" off site)
- High cooling/heating capacities
- Low noise and low draft risk makes for high comfort levels
- Beam aesthetic can be customised to client requirements
- Single point of responsibility for the design, integration, manufacture and testing of all services ("Plug and Play")

## FTF Group's unique benefits

- 'In-house' lighting design and luminaire development
- Passive MSCBs deliver cooling via radiant absorption and convection
- Active MSCBs deliver high cooling capacities with minimal supply air volume
- Considerable experience in the design and supply of both active and passive types of MSCB
- Only company whom manufacture inhouse the services offered and to also have the inhouse test facilities for all the services offered

## In-house Testing Facilities;

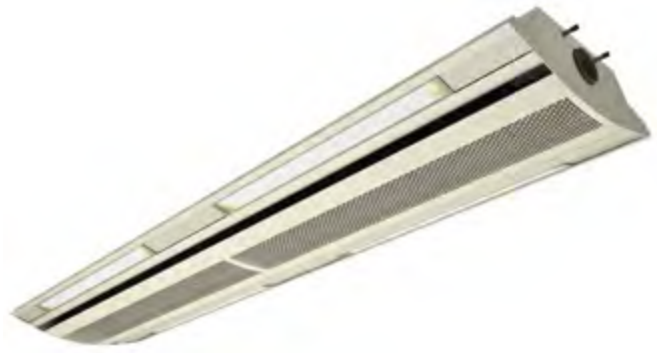
FTF Group also has the following in-house test facilities which enable us to develop and offer clients with bespoke MSCB designs;

- 3 number state of the art Climatic Test Laboratories (BSRIA calibrated).
- 2 number Photometric Test Labs along with lighting design in accordance with CIE 127:2007 and BS EN 13032-1 and sound engineering practice.
- Acoustic testing semi-anechoic chamber which measures Class 1 measurements at 11 different 1/3 octave bands between 16Hz to 16kHz.

Active MSCB

Radiant Passive MSCB

Radiant Passive MSCB



Active MSCB

# Chilled Ceilings - First Generation

## Introduction & Overview

### Technical Advancements of Chilled Ceilings

Static cooling systems (chilled ceilings) have, over the past 40 years, proven themselves capable of delivering high levels of occupancy comfort at reduced running costs. **Frenger designed, supplied and installed the "World's Largest Radiant Chilled Ceiling" system in 1962; the 175,000 square meter, 27 stories high, Shell Oil headquarters, situated on the River Thames in London.** This building was also the first fully sealed air conditioned building in Europe and was revolutionary at its time as this Frenger Chilled Ceiling used the River Thames water to cool the building down. This was achieved by pumping in cool water from upstream to a secondary heat exchanger which in turn cooled (took heat out of the building by "Radiant" absorption) the building down, then depositing the warmer return water from the secondary heat exchanger down stream. **This installation is still operating after nearly 50 years and is a testament to the integrity of the product and to Frenger's design capabilities.**

Shell Oil HQ, River Thames

Since this time the cooling requirements for a typical office environment have increased considerably; higher occupancy densities and a much higher usage of IT equipment have all fueled this increase. It became apparent in the mid 1990's that the cooling capacity of a traditional chilled ceiling was not sufficient to meet these increased heat-gains, and consequently higher-capacity passive chilled beam fin coil batteries were introduced into perimeter zones to offset the solar load generated at the building façade.

Although fin coil batteries provided the extra cooling at lower cost in $ / BTU than the traditional radiant chilled ceiling, the perimeter aesthetics suffered due to the fin coil batteries requiring large size perforations and percentage open area to allow air ("convection") to circulate and this also reduced occupancy comfort, due to higher air velocities.

Traditional Radiant Chilled Ceiling

Frenger however saw the opportunity to take all the benefits from a traditional radiant chilled ceiling for radiant cooling, and to develop a "hybrid" product solution that also has the cooling performance of convective only passive beams. The hybrid retained a 40%"Radiant cooling" quotient to yield similar aesthetics as associated with the traditional Radiant Chilled Ceilings, also with low air velocities (for compliance to ISO 7730 European Standard for "Indoor Air Comfort Conditions") and a 60% convection element for high output cooling. Frenger's "hybrid" Radiant / Convective Chilled Beams are detailed on pages 10 and 11.

"Hybrid" Radiant / Convective Chilled Beam Ceiling

These attractive high quality ceiling systems provide the best in occupancy comfort given their high "Radiant" quotient. **Approximately 70% of the total cooling is by radiant absorption and the remaining 30% by convection if the back of the tiles are insulated**, and circa 55% Radiation and 45% Convection if the cooling tiles are un-insulated.

The cooling tiles are constructed from zinc coated steel which is polyester powdercoated to whatever the project colour requirements are.

Aluminium extruded heat exchange “pipeseats” are powder-coated black and are bonded to the back of the perforated metal tile. The tiles can be any size and as large as 55 ⅛ in x 53 ⅝ in, these are known as “Mega Tiles”. The tiles are usually insulated with black tissue faced mineral wool pads with a class ‘O’ foil backing for increased “Radiant” component (70% Radiation / 30% Convection).

**Typically the cooling effect is 25.4BTU/hr/ft² of activated chilled ceiling tiles if insulated** and 28.5BU/hr/ft² of activated chilled ceiling tiles is possible if the ceiling tiles are un-insulated, however the Radiant component reduces to approximately 55% and the rest of the cooling is by 45% Convection-element when the tiles are un-insulated.

**The above listed cooling effects are based on 47.3°F diference between “mean water temperature” (MWT) and the “design room temperature”, known as dTF.**

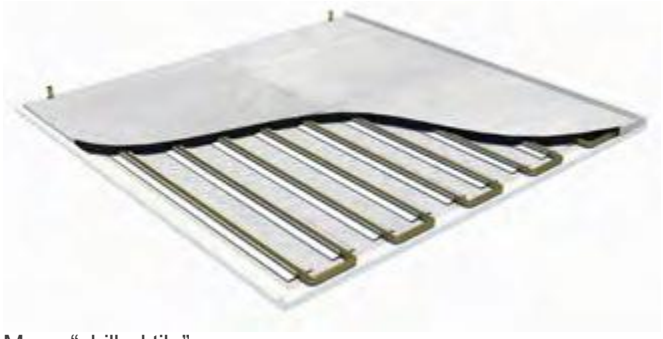
Ordinarily, the ceiling grid (Tartan Grid as shown in the picture above right) can represent circa 20% of the overall ceiling if the grid was 60in x 60in and each plain grid was 6in wide. An allowance of approximately 8% of the total ceiling area being taken up by light fittings should also be taken into consideration when calculating the nett cooling effect on the floor area below the traditional type chilled ceiling. The rule of thumb is that circa 72% of the total ceiling area (room size) is to be activated by cooling coils. **As such 25.4BTU/hr/ft² usually netts out at 18.3BTU/hr/ft² on the floor** (insulated tiles) and 28.5BTU/hr/ft² netts out at 20.5BTU/hr/ft² on the floor (uninsulated tiles) at 15.3dTF.

Should more of the ceiling be required to be activated this is usually achieved by the use of lay-in chilled tiles on an exposed grid, as detailed in the picture opposite.

These solutions are both energy efficient and very low maintenance and provide high levels of radiant absorption which is the best form of cooling possible.

**Should, however more cooling be required than that of a traditional first generation chilled ceiling then see pages 10 and 11 for Frenger’s hybrid of a radiant chilled ceiling and a passive chilled beam to provide the high cooling duties achieved with passive chilled beams, whilst maintaining a good level of radiant absorption (approximately 40% radiant absorption) for improved occupancy comfort.**

With Frenger’s Radiant Chilled Beams the customer has freedom of choice of ceiling aesthetic and construction type and from any ceiling manufacture even with small perforations (0.094”, 0.118”) and low percentage open area (28%, 40%) as associated with the traditional contact type radiant chilled ceiling solutions.



Mega “chilled tile”

Tartan Grid Ceiling

Lay-in “chilled tile”

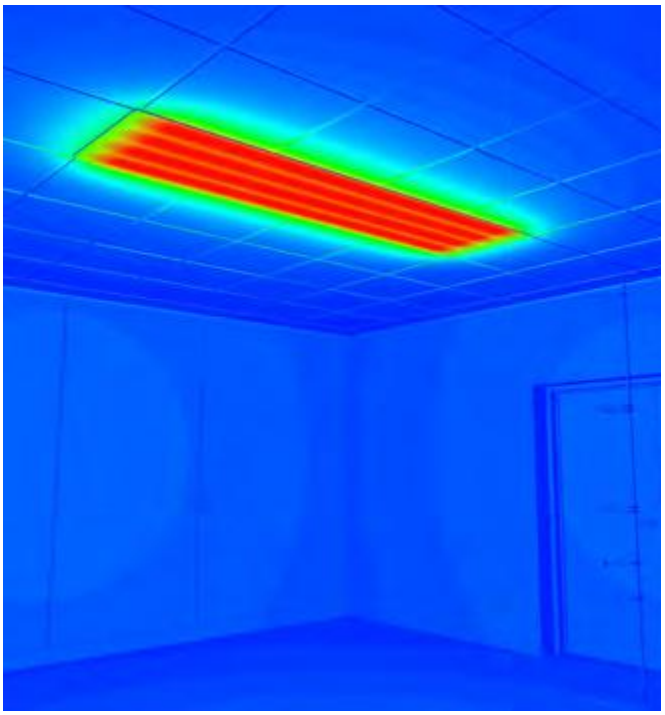
Exposed grid for lay-in “chilled tiles”

# Radiant Heating

## Radiant Heating Principles

Radiant heating is a highly effective method of heating a room. Radiant ceiling panels heat all of the room's surfaces (walls, floor, desks etc...), which in turn heat up the air within the room. Radiant panels also provide heat directly to the occupants. Consequently, radiant heating affords an extremely comfortable indoor environment, where there is little risk of the person feeling too cold under the table or too hot on the head given the surface temperature of the panels. Furthermore, radiant heating focuses on the areas where heating is most required - the coolest items in the room (usually the external walls and windows). Unlike convective heating, an increase in ceiling height does not significantly increase the amount of heat required, hence radiant heat is perfect for large open areas with alot of air volume.

Radiant ceiling heating systems function in virtually all types of buildings, from busy office environments, large warehouses, large hospitals to small day-care centres. The system can be easily modified to suit changes to the wall or floor layout making it an extremely flexible heating solution.



## Key features of high level Radiant Heating

- Good thermal climate
- Releases valuable floor and wall space
- Heat goes where it is most needed – reduces the risk of cold draughts
- Low temperature gradient of the air within the room from floor to ceiling (32.9°F/ft as opposed 35.6°F/ft for fan convective heaters)

## Modula

Frenger's Modula radiant panel is a high-performing smooth faced heating unit. Copper pipes are fixed rigidly to the rear of either steel or aluminium panels via extruded aluminium pipe seats for optimum heat transfer. The panel is designed to be free-hanging or integrated into a standard exposed grid ceiling system. Operating weight is a lightweight 46.2lb/ft². Panels are backed with 1ft thick foil-backed class '0' insulation, and are finished polyester powder coat white RAL9010 as standard.

- Modular system
- Up to 10ft long as a single unit
- 174.3 BTU/hr/ft² @ 99.9 dTF room (mwt - room temp)

Modular is particularly suited for use in hospital wards and corridors, school halls, classrooms and offices. In fact anywhere where there is a need for high capacity heating with a lightweight aesthetically-pleasing panel.

## FrengerWarm

Frengerwarm is a system of custom made, smooth faced aluminium or steel panels manufactured to any length/width/ shape to suit the application. Panels can be wall mounted, free-hanging, surface mounted or recessed into a suspended ceiling system. Copper pipes are fixed rigidly to the rear of the panels via extruded aluminium pipe seats for optimum heat transfer. Panels are backed with 60mm thick foil-backed class '0' insulation, and are finished polyester powdercoat white RAL9010 as standard.

- Modular or perimeter system
- Can be customised to suit environment
- Up to 171.2 BTU/hr/ft² @ 99 dTF room

FrengerWarm is particularly suited for use in school gymnasiums and classrooms, hospital wards, corridors and offices. Frenger's bespoke manufacturing approach enables us to accommodate most applications, including mitred details and column trimming.

## Prison Heating

Frenger's Secure Environment™ range of anti ligature heating products are designed to provide reliable, efficient and unobtrusive heating within Safer cell, MHU (Mental Health Unit) and other secure environments.

The purpose made UK manufactured product range features three core products that are designed to satisfy the exacting requirements of any secure environment:-

- PCP Frengerwarm Ceiling Panel
- PNP Frengerwarm Cornice Panel.
- PR Frengerwarm Radiator.

Each Product is designed to operate with LTHW and have been fully performance tested in accordance with the latest appropriate standards (EN14037/BS EN 442).

All purpose designed systems are constructed from reinforced steel paneling and include secure fixings as standard. The anti-vandal construction also takes account of designing out any ligature points. Each of these product ranges ("PCP", "PNP" and "RR") have been fully destruction tested and are considered by NOMS (National Offenders Management Service) to be fully compliant with the Custodial Property Specification (STD/M/SPEC040) which covers the use of radiant heating panels within Safer Cells.

- Considered as NOMS compliant
- Purpose made systems can be tailored to suit almost any secure environment.
- Designed to operate with LTHW water supplies.
- Capacities in excess of 110.9 BTU/hr/ft² @ 99.9 dTF room.

## EcoSrtip

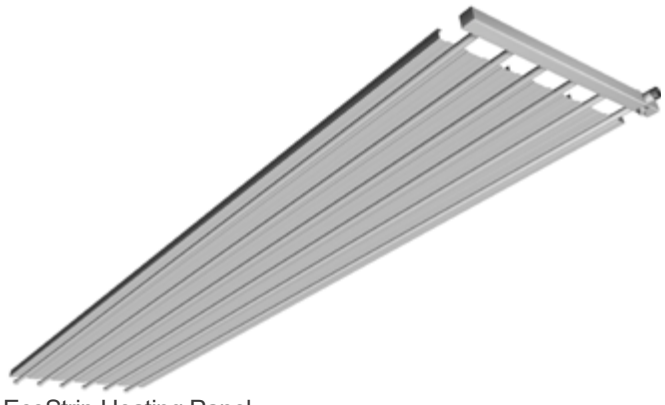
EcoStrip™ is an ideal solution for the industrial heating of larger buildings such as aircraft hangars, sports halls and factories. It may be wall mounted or free-hanging and is available in lengths from 157 31/64" to 4724 13/32". Steel panels pre-fixed to ½" steel pipework grids to create the radiating surface. Panels are available as standard in either RAL9010 (white) or RAL9002 (grey) paint finish.

- Linear product
- Can be fabricated on site in lengths up to 4724 13/32"
- Designed to operate with LTHW, MTHW and HTHW water supplies
- 144.9 BTU/hr/ft² @ 99.9 dTF room

Prison Panel Radiator

Cornice Prison Panel

Prison Ceiling Panel



EcoStrip Heating Panel

# Acoustic Lighting and Heating Rafts

Frengers Acoustic Lighting and Heating Rafts, otherwise known as Multi Service Radiant Panels (MSRP's) consist essentially of a free hanging radiant heating panel coupled with other services such as:-

- Lighting
- Acoustic Sound absorbing materials
- Apertures for sprinkler heads
- Compartment trunking for other electrical services
- Apertures for PA and VA speakers
- Lighting Control, PIR and Photocells

## Radiant Heating

The radiant heating element is the same technology as utilised for Frenger's tried and tested Modula panels.

The panel is constructed from zinc coated steel which is perforated and folded to the project specific requirements before being polyester powder coat finished to any RAL colour as required, (RAL 9010 is standard).

The panel utilises Frenger's optimised extruded aluminium heat exchanges and seamless copper tube heating elements.

## Lighting

Virtually any type of lighting solution can be accommodated by Frenger's MSRP and all lighting is manufactured in house and bespoke to the project solution. Direct only, indirect only, combination of direct and indirect lighting from either the same light source or different sources can be accommodated. T5 florescent or LED light sources, aluminium louvers, micro lens optics, opal acrylic or even extruded acrylics for continuous / seamless lighting can be accommodated.

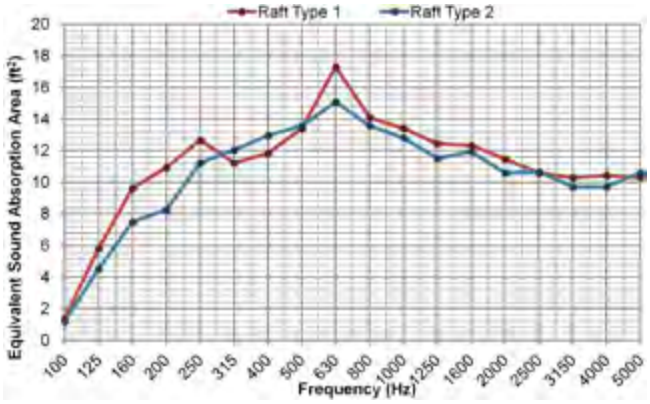
All lighting is designed in house using lighting software design packages and the prototyped and photometered in Frenger's in house Photometric Laboratory and Integration Chamber for L.O.R (Light Output Ratios). Frenger convert to Lumdat files and produce lighting calculations for the space requirement using Relux / Dilux for compliance to CIBSE Lighting Guides LG3/7.

## Acoustic Sound Absorbing Materials

The perforate areas of the radiant panel are covered with black tissue faced insulating material with a foil backing effectively sandwiched in the middle of two layers of acoustic insulating material, the top layer of which has black tissue acoustic material face upwards as shown in the Figure 1.

Frenger's have their own in house sound laboratory and also make use of third party acoustic testing for verifications.

**Note**: Acoustic Absorption Area (m ) figures detailed below are per linear m of MSRP, hence the absorption area's should be multiplied by the chosen MSRP length.Data based upon independent testing conducted by SRL (Sound Research Laboratories) Ref. C/21760/R01 to BS EN ISO 354:2000.




Heating Raft Type 1

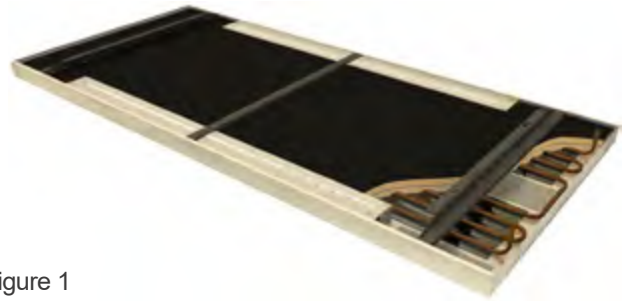


Figure 1

Heating Raft Type 2

# Large Project Experience

Frenger has vast experience and a proven track record of successfully delivering large complex international projects.












*"Frenger designed, manufactured, supplied and installed in excess of 4500 Active Multiservice Chilled Beams for the prestigious 55 Baker Street project - the UK's largest MSCB project to date."*

*"The extensive refurbishment of 101 New Cavendish Street has been a most distinguished project incorporating nearly 2 kilometers of Frenger's Active Multiservice Chilled Beams over 4-floor levels"*

*"Frenger successfully designed and supplied over 3,600 linear feet of "Radiant"/ Convective Passive Multiservice Chilled Beams to the new HML HQ building, a subsidiary of Skipton Building Society"*

# Project References

**50 Flinders Street**
Adelaide, Australia - 2014
Passive Chilled Beams

**NIA Birmingham**
Birmingham, UK - 2014
Passive Chilled Beams

**Northwick Park Hospital**
Harrow, UK - 2014
Active Chilled Beams

**West Suffolk House**
Ipswich, UK - 2014
Passive Chilled Beams

**240 Blackfriars Road**
London, UK - 2014
Active Chilled Beams

**West Yorkshire Police**
Wakefield, UK - 2014
Passive Chilled Beams

**18-20 Grosvenor Street**
London, UK - 2014
Active Chilled Beams

**Great West House**
London, UK - 2013/14
Active Multiservice

**1 Canberra Avenue**
Australia - 2013
Passive Chilled Beams

**BBC Grafton House**
Middlesex, UK - 2012
Active Chilled Beams

**Box Hill Hospital**
Australia - 2007
Active Chilled Beams

**Frimley Park Hospital**
Frimley, UK - 2011
Active Chilled Beams

**HDTI**
Coventry, UK - 2008
Active Chilled Beams

**Holmesglen Institute**
Australia - 2010
Active Chilled Beams

**SIEC Tonsley House**
Australia - 2013
Active & Passive Chilled Beams

**ANU**
Australia - 2013
Active Chilled Beams

**Anglia Ruskin University**
Cambridge, UK - 2013
Passive Multiservice

**IMAS Hobart**
Australia - 2012
Passive Chilled Beams

**Beaufort House**
London, UK - 2012
Passive Multiservice

**Neo Bankside**
London, UK - 2012
Active Multiservice

**5 Murray Rose Avenue**
Sydney, Australia - 2012
Passive Chilled Beams

**Exeter University**
Exeter, UK - 2012
Active Chilled Beams

**Stafford College**
Stafford, UK - 2012
Active Chilled Beams

**Wyre Forest**
Kidderminster, UK - 2012
Active Multiservice

**Trinity Grammer**
Trinidad & Tobago - 2012
Passive Chilled Beams

**Cambridge Metallurgy**
Cambridge, UK - 2012
Passive Chilled Beams

**Tate Modern**
London, UK - 2012
Passive Chilled Beams

**65 Southwark Street**
London, UK - 2012
Active Multiservice

**700 Bourke Street**
Australia - 2012
Passive Chilled Beams

**Veolia Environmental**
Cannock, UK - 2012
Passive Chilled Beams

**Grosvenor Hill**
London, UK - 2012
Passive Multiservice

**CISCO**
Reading, UK - 2012
Active Multiservice

**Langley Point**
Birmingham, UK - 2012
Passive Chilled Beams

**Common Wealth Bank**
of Australia, Sydney - 2012
Passive Chilled Beams

**Southampton Civic Centre**
Southampton UK - 2011
Active Multiservice

**Trinidad School**
Trinidad & Tobago - 2011
Passive Chilled Beams

**Domino's Pizza HQ**
Milton Keynes, UK - 2011
Passive Multiservice

**Eskom, Megawatt Park**
South Africa - 2011
Passive Chilled Beams

**Vodafone Innovation**
South Africa - 2011
Passive Chilled Beams

**World Park**
Adelaide, Australia - 2011
Passive Chilled Beams

**Walthamstow Station**
Walthamstow, UK - 2011
Passive Chilled Beams

**King Saud Bin Abdul**
Saudi Arabia - 2011
Active Chilled Beams

**Gatwick Search Area**
London, UK - 2011
Passive Chilled Beams

**All Saints Academy**
Cheltenham, UK - 2011
Passive Chilled Beams

**24 Britton Street**
London, UK - 2011
Passive Multiservice

**University of Botswana**
Botswana - 2011
Active Chilled Beams

**Royal London Hospital**
London, UK - 2011
Active Multiservice

**City Centre Tower 8**
Australia - 2011
Passive Chilled Beams

**Wollongong University**
NSW. Australia - 2011
Passive Chilled Beams

**Melbourne University**
Australia - 2010
Active Chilled Beams

**Walsall Hospital**
Walsall, UK - 2010
Active Chilled Beams

**Macmillan Renton Unit**
Hereford, UK - 2010
Active Chilled Beams

**Kangan Batman Tafe**
Australia - 2010
Active & Passive Chilled Beams

**HML Headquarters**
Skipton, UK - 2010
Active Multiservice

**123 Albert Street**
Brisbane, Australia - 2010
Passive Chilled Beams

**500 Collins Street**
Australia - 2010
Active Multiservice

**Google Headoffice**
Sydney, Australia - 2010
Passive Chilled Beams

**Royal Hobart Hospital**
Hobart, Tasmania - 2010
Active Chilled Beams

**RMIT 9**
Australia - 2010
Active Chilled Beams

**Belconnen Police**
Australia - 2010
Passive Chilled Beams

**Five Rivers**
Trinidad - 2010
Passive Chilled Beams

**Good Hope Hospital**
Sutton, UK - 2010
Active Chilled Beams

**1 Lancaster Circus**
Birmingham, UK - 2010
Passive Multiservice

**Kingswood Lakeside**
Cannock, UK - 2010
Passive Chilled Beams

**Meridian Court**
Edinburgh, UK - 2010
Active Chilled Beams

**Sudima Hotel**
New Zealand - 2010
Active Chilled Beams


**New Scotland Yard**
London, UK - 2010
Passive Chilled Beams

**CIT**
Canberra, Australia - 2010
Active Multiservice

**Telcom Square**
New Zealand - 2010
Passive Chilled Beams

**Anglia University**
Cambridge, UK - 2010
Passive Multiservice

**Liverpool College**
Liverpool, UK - 2010
Active Chilled Beams

**Knightsbridge Hotel**
London, UK - 2010
Passive Chilled Beams

**Loxford School**
London, UK - 2009
Active Chilled Beams

**Cheshire Police**
Cheshire, UK - 2009
Active Chilled Beams

**New Cavendish Street**
London, UK - 2009
Active Multiservice

**Transport House**
Sydney, Australia - 2009
Active Multiservice

**Civic Offices**
Southampton, UK - 2009
Active Chilled Beams

**Kingston Aged Care**
Australia - 2009
Active Chilled Beams

**Monash University**
Australia - 2009
Active Chilled Beams

**Warnambool Hospital**
Australia - 2009
Active Chilled Beams

**1 Shelly Street**
Sydney, Australia - 2009
Passive Chilled Beams

**South Australia Police**
Adelaide, Australia - 2009
Passive Chilled Beams

**Kings College**
London, UK - 2009
Passive Chilled Beams

**Batman Street**
Australia - 2009
Passive Chilled Beams

**St Barts Hospital**
London, UK - 2009
Active Chilled Beams

**Edmund Barton**
Canberra, Australia - 2009
Active Chilled Beams

**ACAD Hospitals - Stobhill**
Glasgow, UK - 2008
Active Chilled Beams

**King Street Wharf**
Australia - 2008
Passive Chilled Beams

**55 Baker Street**
London, UK - 2008
Active Multiservice

**Sydney Water House**
Australia - 2008
Passive Chilled Beams

**Wrexham A&E**
Wrexham, UK - 2008
Active Chilled Beams

**Coventry University**
Coventry, UK - 2008
Active Chilled Beams

**Gatwick Terminal**
London, UK - 2008
Passive Chilled Beams

**Suffolk County Council**
Suffolk, UK - 2008
Passive Chilled Beams

**Bidborough House**
London, UK - 2008
Active Chilled Beams

**Hallward Library**
Nottingham, UK - 2008
Active Multiservice

**One East Melbourne**
Victoria, Australia - 2008
Passive Chilled Beams

**Kings Cross**
London, UK - 2008
Active Chilled Beams

**Cambridge Library**
Cambridge, UK - 2008
Active Chilled Beams

**QMC Hospital**
Nottingham, UK - 2008
Active Chilled Beams

**GRI Gynae**
Glasgow, UK - 2008
Active Chilled Beams

**Business Centre**
Liverpool, UK - 2008
Active Chilled Beams

**Wesley House**
Brisbane, Australia - 2008
Passive Chilled Beams

**Liverpool Int. Business Park**
Liverpool, UK - 2007
Active Chilled Beams

**64 Allara Street**
Australia - 2007
Passive Chilled Beams

**Sydney Olympic Park**
Sydney, Australia - 2007
Passive Chilled Beams

**Duke Street**
London, UK - 2007
Active Multiservice

**University of Sydney**
Sydney, Australia - 2007
Passive Chilled Beams

**413 George Street**
Sydney, Australia - 2007
Passive Chilled Beams

**Hills Science Park**
Malvern, UK - 2006
Active Chilled Beams

**London Circuit**
Canberra, Australia - 2006
Passive Chilled Beams

**Edinburgh Council**
Edinburgh, UK - 2006
Passive Multiservice

**National Farmers Union**
Warwickshire, UK - 2006
Passive Multiservice

**Project Vauxhall**
UK - 2006
Passive Chilled Beams

**Parramatta Justice**
Sydney, Australia - 2006
Passive Chilled Beams

**National Audit Office**
London, UK - 2005
Active Multiservice

**500 Collins Street**
Australia - 2005
Active Multiservice

**City Central Tower**
Adelaide, Australia - 2005
Passive Chilled Beams

**Merck Sharp & Dohme**
London, UK - 2004
Active Multiservice

**10 Green Coat Place**
London, UK - 2004
Active Multiservice

**Saffron Hill**
London, UK - 2004
Active Multiservice

**Experian**
Nottingham, UK - 2004
Passive Multiservice

**Woolworth House**
London, UK - 2003
Active Multiservice

**The Bond**
Australia - 2003
Passive Chilled Beams

**BT Leavesden**
Watford - 2002
Passive Chilled Beams

**Ealing Studios**
London, UK - 2002
Passive Multiservice

**Royal Sussex Hospital**
Brighton, UK - 2002
Active Chilled Beams

**Vodafone**
London, UK - 2001
Passive Chilled Beams

**Gordon House**
London, UK - 2001
Active Multiservice

**BT Nottingham**
Nottingham - 1998
Passive Chilled Beams

# Industry Associations

Always mindful of its place within the HEVAC industry, Frenger Systems (trading as FTF Group Climate) pride themselves on broad range of trade associations and accreditations. With a clear service, product and environmental ethos across everything they do, Frenger is focused on meeting and consistently surpassing the expectations of its customers. Frenger Systems (trading as FTF Group Climate) invest heavily in achieving industry recognised accreditations and as part of ongoing commitment to their customers and continually assess the level of services they provide. Opening up their company to these independent organisations allows them to continually improve our customer service and satisfaction.

As an engaged member of the HEVAC industry, Frenger Systems (trading as FTF Group Climate) are actively asked to participate in industry specific discussions and studies. With this in mind Frenger Systems (trading as FTF Group Climate) are proud to have achieved and be linked with the following associations:

## BSI EN ISO 9001:2008

Frenger Systems (trading as FTF Group Climate) are registered by BSI for operating a Quality Management System which complies with the requirements of BS EN 9001:2008.

## Eurovent

Frenger Systems (trading as FTF Group Climate) participate in the EC programme for Chilled Beams.Check ongoing validity of certificate: www.eurovent-certification.com or www.certiflash.com

## Chilled Beam and Ceiling Association

The Chilled Beam and Ceiling Association has been formed by leading companies within the construction industry. The objective of the Association is to promote the use of Chilled Beams and Chilled Ceilings, and encourage best practice in their development and application.

## HEVAC Member

HEVAC is the heating and ventilating contractors association. As a HEVAC member Frenger Systems (trading as FTF Group Climate) are subject to regular, third party inspection and assessment to ensure their technical and commercial competence.

## Federation of Environment Trade Association

The Federation of Environment Trade Association (FETA), of which Frenger Systems (trading as FTF Group Climate) is a member of, is the recognised UK body which represents the interests of manufacturers, suppliers, installers and contractors within the heat pump, controls, ventilating, refrigeration & air conditioning industry.

## UK Trade & Investment

Frenger Systems (trading as FTF Group Climate) are members of both the UK TI (the former Department of Trade and Industry) as well as the Chamber of Commerce for Export Documentation.

## Certified CIBSE CPD

Frenger Systems (trading as FTF Group Climate) is a CIBSE approved “Continued Professional Development” (CPD) provider. Frenger Systems (trading as FTF Group Climate) offers 1 hour lunch time CPD presentations regarding “Chilled Beam Technology”, CPD presentations (Lunch and Learn) are usually held at Consulting Engineers local practices with lunch provided courtesy of FTF Group Climate. Alternatively Chilled Beam Technology training is available at Frenger’s UK Technical Academy in a dedicated training theatre with fully operational BMS system with various different Chilled Beam and Ceiling solutions integrated.

Booking of a CPD Presentation can be requested on FTF Group Climate home page, under the drop down menu headed “Company”, then “CPD Booking”. Alternatively email sales@ftfgroup.us

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