*the future of space conditioning*

# Eco™

## active chilled beam

www.FTFgroup.us

FTF GROUP® Climate

## Contents

# Product Description

Eco* is one of the FTF Group's latest range of high performance Chilled Beams. Energy efficiency has been a key driver for such advancements in the FTF Group's Chilled Beam Technology.

**Eco is 9" deep as standard** and can be increased to **10.5" deep for higher air volumes.** Eco and can achieve **1004 BTU/hr/ft total cooling** (based on 18dTK and 16 CFM/ft for a 8ft beam supplied at 60°F with a 0.4in$H_2O$).

The Eco beam contains a number of **Patented performance enhancing features** and as can be expected from the FTF Group's brand, the Eco beam is also designed to be easily tailored to suit the unique parameters of individual project sites, for the optimum product / system efficiencies. This is partly achieved by the "burst nozzle" arrangement that not only encourages induction, but also reduces noise. Given the size and amount of burst nozzles being appropriately quantified for each project, this provides consistent jet velocities, equal distribution of the air discharge and continuous induction through the entire length of the heat exchanger (battery). There are no dead spots due to plugging back nozzles from a standard pitch or having to adjust the pressure in the system to suit the amount of open standard nozzle sizes as associated with many competitors' active beams as dead spots and / or reduced jet velocities decrease their cooling capacities / efficiencies.

Heat exchanger batteries are also fitted with extruded aluminum profiles to not only enhance performance but also provide a continuous clip on facility for the underplates. This arrangement keeps the underplates true and flat for long lengths, even up to 11ft 8".

Eco can be used in most types of commercial building where a value engineered solution is preferred such as for ceiling integration. Eco units are finished in RAL 9010 (20% Gloss) White as standard.

Eco is available in any length from 4ft up to 11ft 8" in 4" increments and is constructed from zinc coated mild steel for its outer casing rather than extruded aluminum which is utilized for the FTF Group's other products. This is the area where the value engineering has occurred. The cooling and heating internal components are the same high quality construction for Eco™ as utilized for Compact™ and Ultima™ and as such a similar cooling/heating performance.

The air chamber for Eco is the largest in the FTF Group's product range and can accommodate up to 190 CFM (at special request) with its 6.3" diameter single air inlet connection point.

Eco beams all have a "closed back", thus meaning that all induced air (recirculated room air) is induced through the underplate within the room space to avoid any need for perimeter flash gaps and / or openings in the ceiling system. This also provides for a better quality of recirculated air as the recirculated air does not mix with any air from the ceiling void. The induction ratio of Eco is typically 5 times that of the supply air (fresh air) rate.

In addition to Eco's high cooling performance capability of in excess of 1000 BTU/hr/ft, **Eco can operate well and induce at low air volumes, as little as 2 CFM/ft and even with a low static pressure of just 0.16in$H_2O$. Likewise Eco can handle high air volumes up to 18 CFM/ft and up to 0.48in$H_20$**. Please note however that these high air volumes should be avoided wherever possible and are the absolute maximum and should not ever be exceeded. As a "rule of thumb" 15 CFM/ft from a 2 way discharge beam is the maximum for occupancy comfort to BS EN 7730.

Eco can have integrated heating with separate connections (2 pipe connections for cooling and 2 pipes for heating).

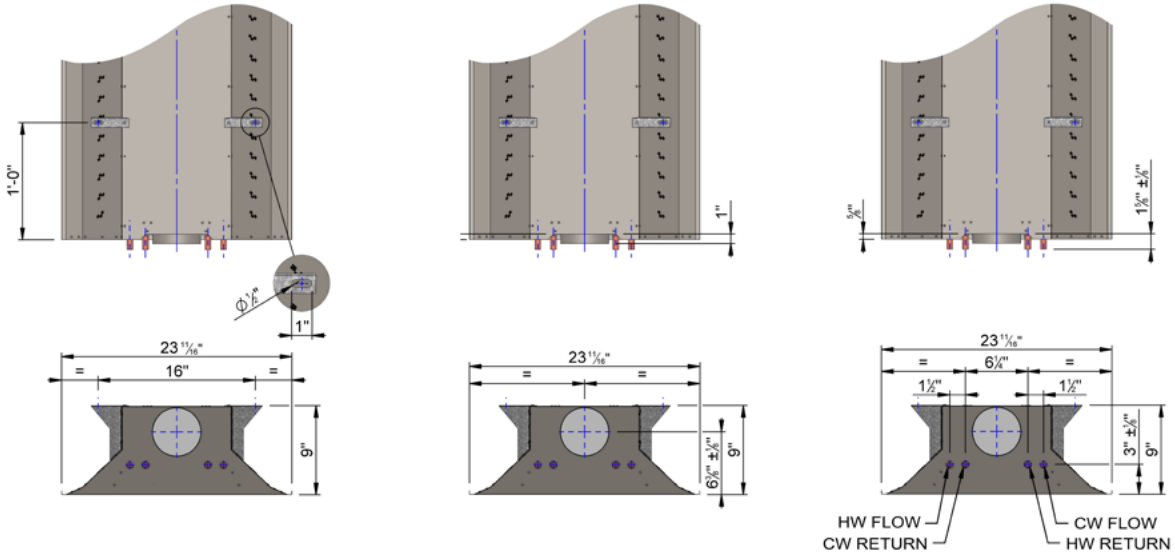
Eco is also available with a **drop down heat exchange battery** for easy cleaning to all 4 sides of the heat exchanger – contact FTF Group's technical department for further information.

## At a glance

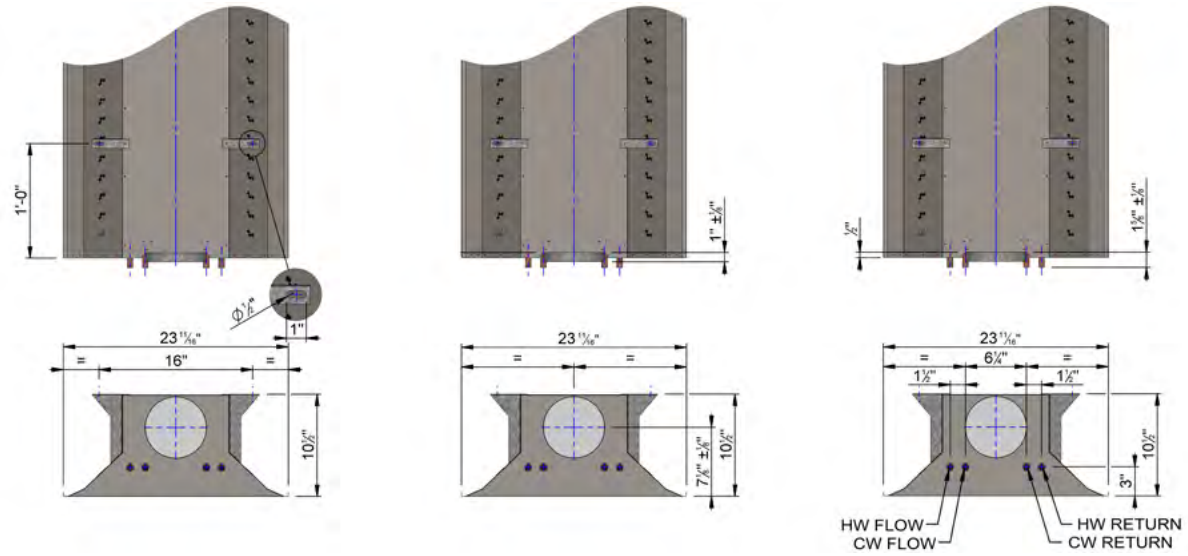
- High output **"1004 BTU/hr/ft"**.
- Can accommodate up to 190 CFM.
- Coanda effect is initiated within the beam.
- Optimize discharge nozzle sizes and pitch factory set to best suit project requirements..
- Coanda effect is initiated within the beam.
- Discharge veins are concealed within the beam for improved aesthetics.
- **Fan shaped distribution for increased occupancy comfort.**
- **Unique fast fixing or removable underplates that prevents any sagging even on long beam lengths of 11ft 8".**
- **Various different perforation patterns available for removable underplates.**
- **Multiple manifold variants to enable reduced chilled** (and LTHW, if applicable) **water mass flow rates** to be facilitated for **increased energy efficiencies.**
- Operates well at "**Low Pressure**" and "**Low Air Volume**" for **increased energy efficiencies**.
- Provides indoor climate **in accordance with BS EN ISO 7730 / ASHRAE 55.**

# Product Dimensions

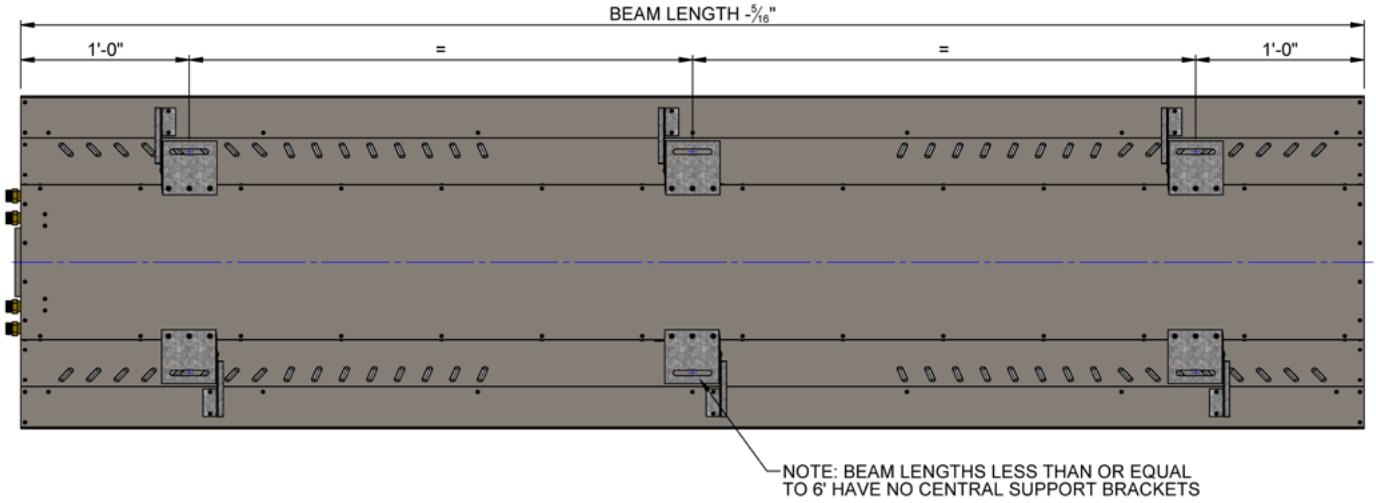
## Eco 5”




## Eco 6”




# Mounting Details



# Perforation Pattern Details

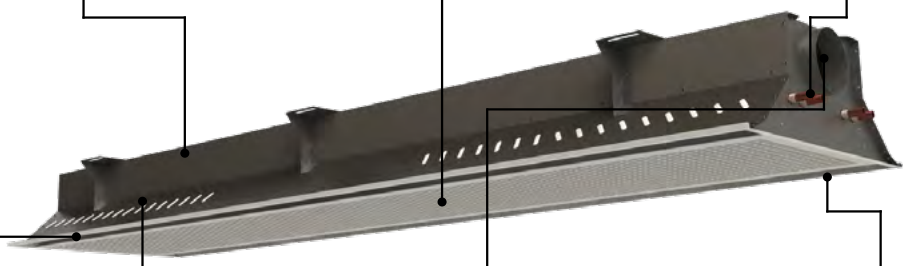
Double Dot Perforation
51% Free Area

## Product Ordering Codes

**2. Function**
**CO -** Ceiling Int. Cooling Only
**CH -** Ceiling Int. Cooling & Heating

**4. Underplate**
**7D -** 7Ø & 4Ø Double Dot / 51% Free Area
**4D -** 4Ø Dot / 33% Free Area
**5S -** 5 X 35 Slot / 45% Free Area

**6. Waterside Connection**
Battery Manifold Types - C1/C2/C3/C4/C5
1/2 C3 H — Orientation - H: Horizontal
Chilled Water Connection Size (in) 1/2" or 3/4"



**1. Beam Type**
**EC -** Eco

**3. Nominal Beam Length (ft/in)**

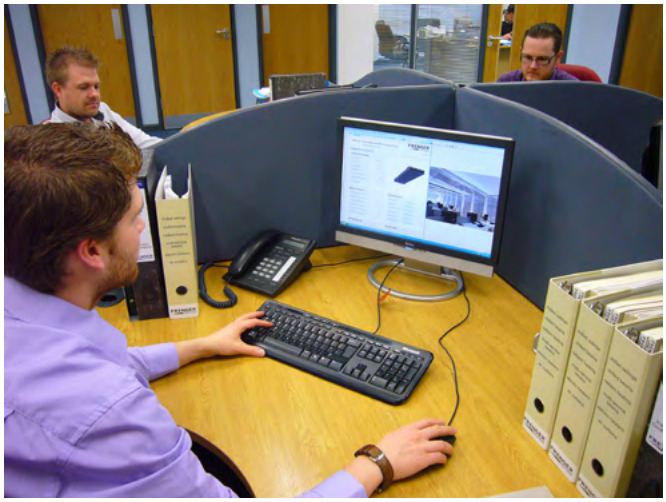
**5. Airside Connection**
Air Connection Qty
1 x 5 H — Orientation - H: Horizontal
Air Connection Spigot Size (in) 5" / 6.2"

**7. Air Supply / Discharge**
Air Supply Volume (CFM)
45 04 M — Air Discharge Characteristic -
L: Long Throw - No Discharge Vanes
M: Medium Thrown - 18° Discharge Vanes
S: Short Throw - 35° Discharge Vanes
Air Supply Nozzle Pressure (in$H_2O$)

Example:

| EC | CH | 8'00" | 7D | - | 1 x 5H | 1/2C3H | - | 4504M |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | | 5 | 6 | | 7 |

# Calculation Programme



**Compact Active Beam Data**

| | | |
|---|---|---|
| Air Connection | 1 x 5" | |
| Product Overall Length | 9' 4" | ft inches |
| Manifold Type | C4 | |
| Air Discharge Throw | M | |
| Nozzle Static Pressure | 0.22 | " $H_2O$ |
| Fresh Air Supply Volume | 70 | CFM |
| Heating Function | Yes | |
| Underplate Perforation Type | 43% OBR | |

The FTF Group's calculation program for Eco is extremely user friendly.

Simply select from the drop down menu the "Air Connection" configuration. Air volumes in excess of 84.8 CFM and up to 106 CFM should be 2 x 80" diameter.

"Manifold types" can be changed in the drop down menu for increased waterside cooling effect, however attention needs to be taken regarding resultant pressure drops (hydraulic resistance). If pressure drops need reducing, choose a higher numbered manifold (C5 being the highest and C2 being the lowest).

"Discharge Throw" can be S (short), M (medium) or L (long).

"Underplate Perforation Type" options can be found on page 11.

**Active Chilled Beam Calculation Tool**

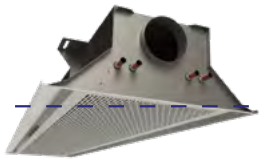
FTF GROUP® Climate

imperial version 1.6 US

Project Ref.

**Compact Active Beam Data**

| | | |
|---|---|---|
| Air Connection | 1 x 5" | |
| Product Overall Length | 7' 8" | ft inches |
| Manifold Type | C2 | |
| Air Discharge Throw | L | |
| Nozzle Static Pressure | 0.32 | " $H_2O$ |
| Fresh Air Supply Volume | 136 | CFM |
| Heating Function | Yes | |
| Underplate Perforation Type | 43% OBR | |



EUROVENT CERTIFIED PERFORMANCE

**Design Conditions**

| | Cooling | | Heating | |
|---|---|---|---|---|
| Flow Water Temperature | 57.0 | °F | 140.0 | °F |
| Return Water Temperature | 62.0 | °F | 100.0 | °F |
| Air Supply Temperature | 60.0 | °F | 68.0 | °F |
| Average Room Condition | 76.0 | °F | 68.0 | °F |
| "Air On" Thermal Gradient | 0.0 | °F | | |
| Room Relative Humidity | 50.0 | % | | |

**Dimensional Data**

| | | |
|---|---|---|
| Width x Depth | 2ft x 0.89ft | |
| Water Volume | 1.0 | gal |
| Dry Weight | 114.6 | lb |
| CW Connection | Ø3/4 | inch |
| LTHW Connection | Ø1/2 | inch |

**Performance Data**

| | Cooling | | Heating | |
|---|---|---|---|---|
| Room - Mean Water dT | 16.50 | °F | 52.0 | °F |
| Waterside Performance | 6067 | BTU/Hr | 7575 | BTU/Hr |
| Water Mass Flowrate | 2.430 | gpm | 0.380 | gpm |
| Waterside Pressure Drop | 3.8 | ft $H_2O$ | 2.2 | ft $H_2O$ |
| Airside Performance | 2366 | BTU/Hr | 0 | BTU/Hr |
| Total Sensible Performance | **8433** | **BTU/Hr** | 7575 | BTU/Hr |
| Sound Effect Lw | < 35 | dB(A) | | |

**Design Check (Warnings)**

| | |
|---|---|
| Supply Air | OK |
| Cooling Circuit | OK |
| Heating Circuit | OK |
| Calculated Dew Point | 56.0 °F |

**Model Ref:** ECCH31505S-1x160H22C5H-6580L

Notes:
1) Performance calculations are based upon normal clean potable water, it is the system engineer's responsibility to allow for any reduction in cooling or heating performance due to additives that may reduce the water systems heat transfer coefficient.
2) Pressure drop calculations are based upon ASHRAE guides using clean potable water and exclude any additional losses associated with entry / exit losses, pipe fouling or changes in water quality; it is the system engineer's responsibility to use good engineering practice.
3) Air discharge throw guidance based on beams on 3m centres for alternative layouts contance FTF Group Technical Dept for throw settings

**Design Conditions**

| | Cooling | Heating |
|---|---|---|
| FloWater Temperature | 57.0 °F | 122.0 °F |
| Return Water Temperature | 63.0 °F | 104.0 °F |
| Air Supply Temperature | 54.0 °F | 67.0 °F |
| Average Room Condition | 76.0 °F | 69.0 °F |
| "Air On" Thermal Gradient | 1.3 °F | |
| Room Relative Humidity | 50.0 % | |

Complete your project data in the "Design Conditions" section. Please note that the "Air On" Thermal Gradient should not be used in normal instances

**Performance Data**

| | Cooling | | Heating | |
|---|---|---|---|---|
| Room - Mean Water dT | 16.0 | °F | 44.0 | °F |
| Waterside Performance | 5185 | BTU/Hr | 4481 | BTU/Hr |
| Water Mass Flowrate | 1.726 | gpm | 0.499 | gpm |
| Waterside Pressure Drop | 6.0 | ft $H_2O$ | 3.3 | ft $H_2O$ |
| Airside Performance | 1802 | BTU/Hr | -155 | BTU/Hr |
| Total Sensible Performance | **6987** | **BTU/Hr** | **4237** | **BTU/Hr** |
| Sound Effect Lw | < 35 | dB(A) | | |

"Performance Data" will then be automatically be calculated. Likewise "Dimensional Date" will be also automatically calculated.

Finally, the "Design Check" should read "Ok" in green, or detail some warnings in red.
Calculation program's for Eco are available upon request.

Contact our technical department or complete an application request form www.ftfgroup.us from the relevant link on our home page.

# Project Specific Testing Facility

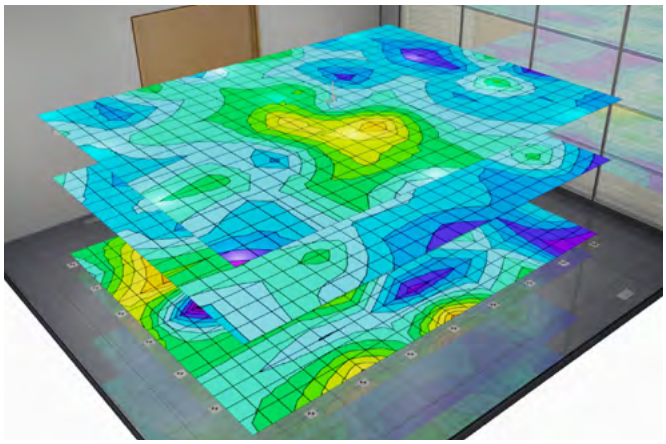
The FTF Group have 3 number state-of-the-art Climatic Testing Laboratories at one if its subsidiary companies predominantly situated at the prestigious Pride Park. Each laboratory has internal dimensions of 20.7ft x 18.7ft x 10.8ft high and includes a thermal wall so that both core and perimeter zones can be modelled. The test facilities are fixed in overall size and construction therefore simulation of a buildings specific thermal mass cannot be completed, it should, however be noted that a specific project can be simulated more accurately by recessing the floor and reducing the height at necessary.

## Project Specific Testing

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 temerature 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.

# Photometric Testing Facility

The FTF Group's technical facility at Pride Park, Derby also has two Photometric test laboratories which 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.

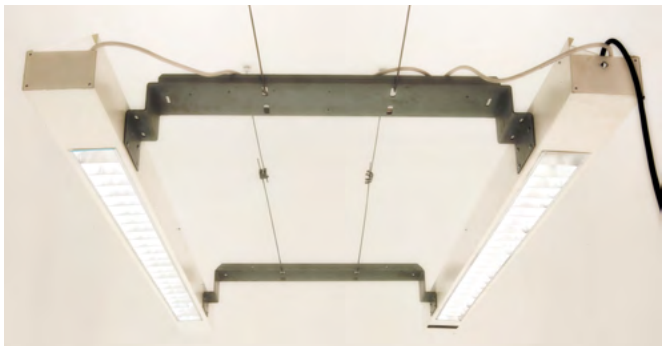
The intensity distibution is obtained by the use of a Goniophotometer to measure the intensity of light emitted from the surface of the fitting at pre-determined angles. The light intensity is measured using either a photometer with a corrective spectral response filter to match the CIE standard observer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

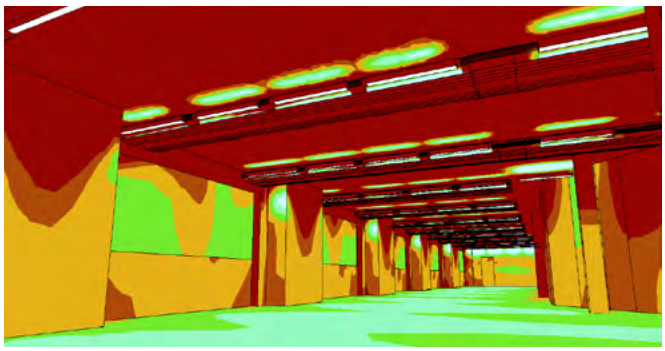
Luminaire outputs are measured using out integrating sphere for small luminaires or out large integrator room for large fittings and Multiservice Chilled Beam. For both methods we can use traceable calibrated radiant flux standards for absolute comparisons.

All tests use appropraite 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.

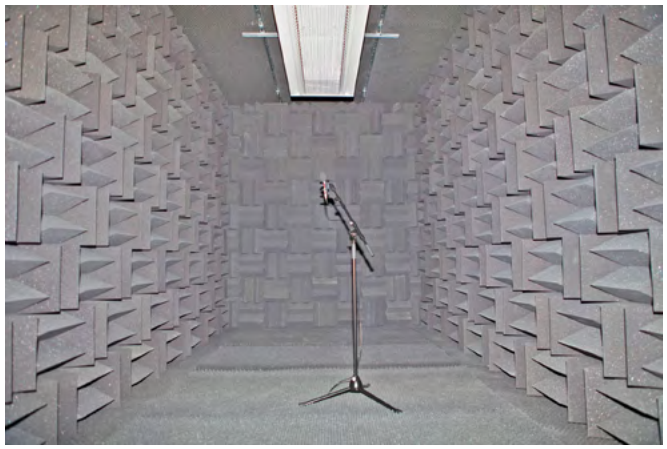
The FTF Groups technically facility also conducts photometric tests in accordance with CIE 127:2007 and BS EN 13032-1 and sound engineering practice as applicable. During the course of these tests suitable temperature measurements of parts of LEDs can be recorded. These recorded and plotted temperature 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 temperature.





# Acoustic Testing Facility

The Acoustic Test Room at the FTF Groups 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 the FTF Group has the wedges specifically designed to optimise the sound absorption at the peak frequency normally found with our Active Chilled Beam products.

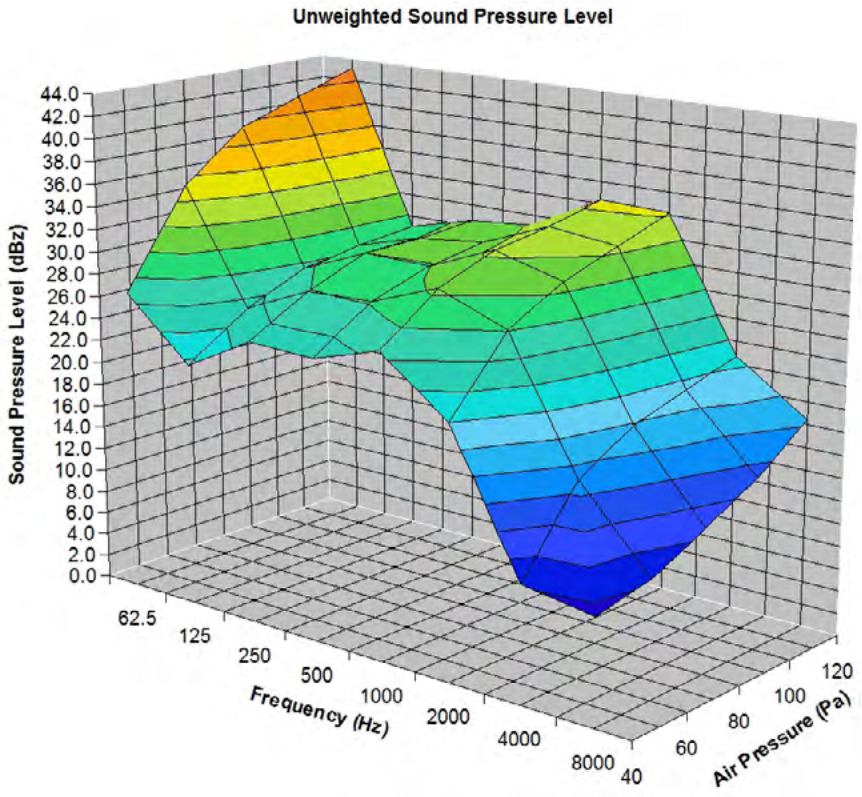


The use of acoustic absorbing material within the test room provides the simulation of a quiet open space without “reflections” which helps to ensure sound measurements from the sound source are accurate, in addition the acoustic material also helps reduce external noise entering the test room meaning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

The acoustic facilities allow the 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 the FTF Group only use Class 1 measurement equipment which allows sound level measurements to be taken at 11 different ⅓ octave bands between 16 Hz to 16 kHz, with A, C and Z (un-weighted) simultaneous weightings.

In addition to the above, the 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 Groups in-house measurement of sound.



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



FTF GROUP® Climate

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