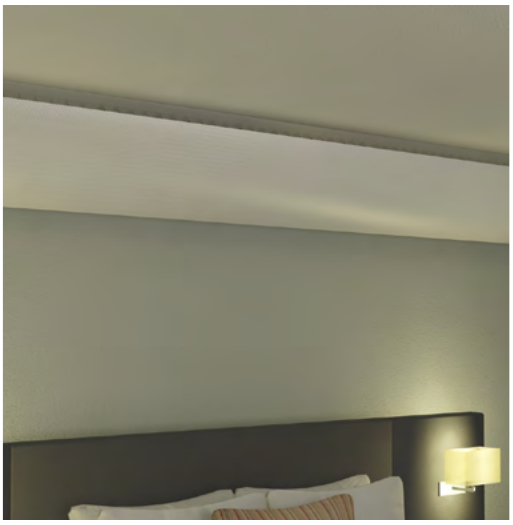
the future of space conditioning

Cornice™

active chilled beam



www.FTFgroup.us

FTF GROUP® Climate

Contents

Product Description

Introduction

Cornice™ 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.

Cornice is only **340mm deep** and can achieve **630 watts per meter total cooling** (based on 10Δtk) and 16 ltrs/sec/m for a beam supplied at 16°C with a 100Pa).

The Cornice beam contains a number of **Patent pending performance enhancing features** and as can be expected from the FTF Group brand, the Cornice beam is 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 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 nozzles 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 aluminium 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 3.6m.

Cornice can be used in most types of commercial buildings (such as cellular offices, banks and hospitals) but are most suited to "Hotel Applications" with its facility to discreetly nestle in the corner along a back wall, usually directly above the bed location.

All induced / recirculated room air is via the unique air intake which conceals the inside workings of the Active Beam even when viewed from directly below, whilst an occupant is resting in bed for example. This is a "Registered Community Design" feature to the FTF Group along with the other features and Patent Pending performance enhancing components.

Cornice discharges its reconditioned air (which is a mixture of circa 20% fresh air and 80% recirculated air) at high level out of the top of the unit which then entrains across the ceiling before gently dispersing and mixing with the room air.

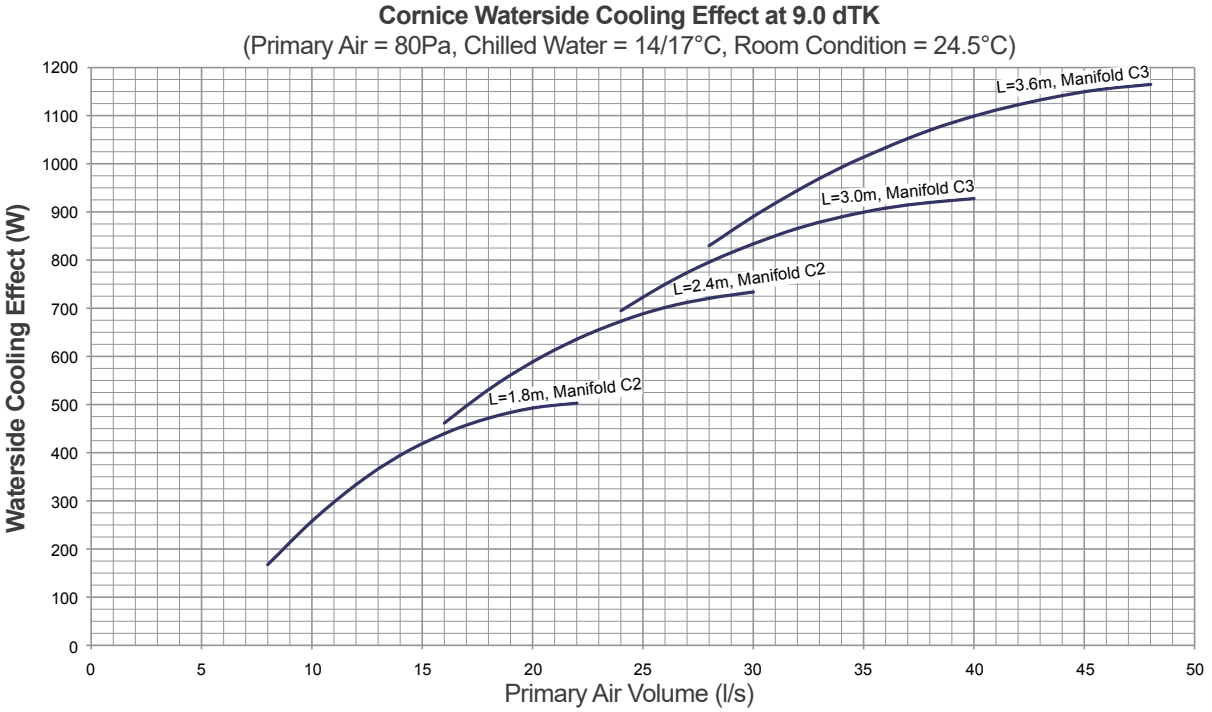
Cornice can have a variety of different fron fascias for different aesthetics. The front fascia is easily removable for cleaning purposes and / or access to the control valves which are neatly concealed behing the removable front fascia.

Cornice is available in any length from 1.8m up to 3.6m in 100mm increments and has another useful design feature of "telescopic" extension ends from the end gables to "fine tune" onsite a "Wall to Wall" installation.

At a glance

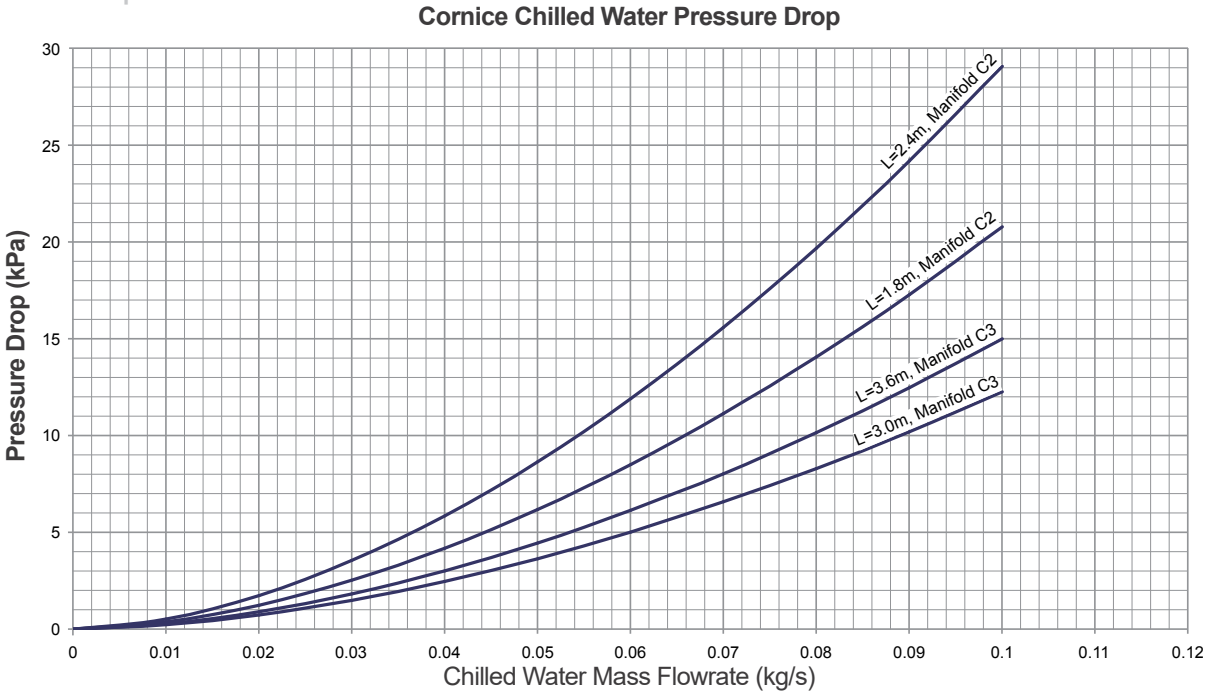
- Telescopic ends for full "Wall to Wall" installation.
- Controls are (factory fitted or site fitted) concealed behind easily removable front fascia panel.
- Lighting can be incorporated within the Cornice unit as an optional extra.
- Different front fascia designs are available for Cornice.
- L.T.H.W heating function (4 pipe) is available.
- Acoustic options for sound reduction material to be added can be accommodated for "silent nights".
- Air deflector on air intake for concealed internal components of the Active Beam for improved aesthetics when viewed from below.

Cooling Performance

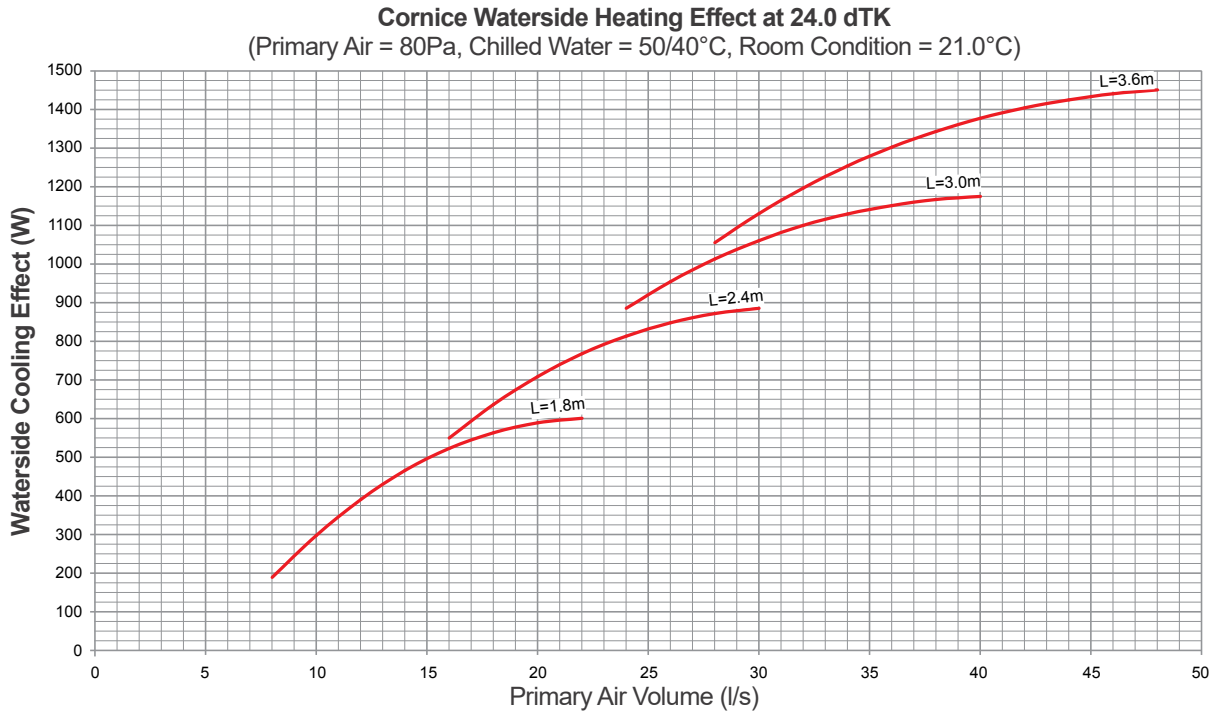


Cooling figures are based on cooling & heating beams, additional cooling is possible with a cooling only product, contact the FTF Group for more information.

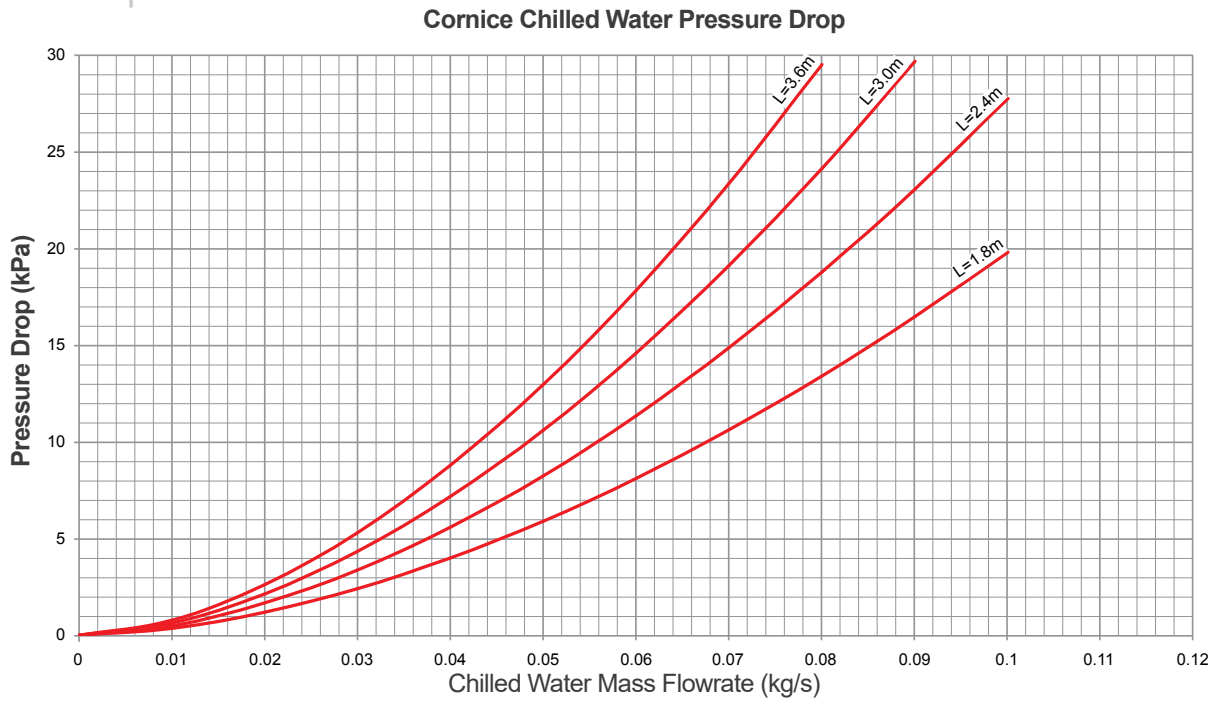
Pressure Drop



Heating Performance



Pressure Drop



Air Cooling Effect

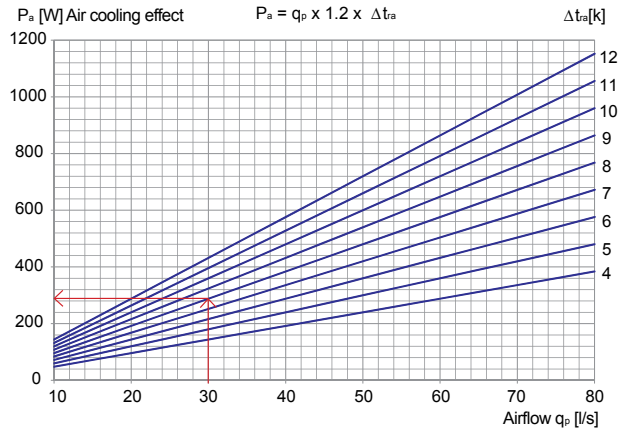
Cooling effect supplied in the ventilation air [W]

1. Start by calculating the required cooling effect that has to be supplied to the room in order to provide a certain temperature.

2. Calculate any cooling effect that is provided by the ventilation air.

3. The remaining cooling effect has to be supplied by the beam.

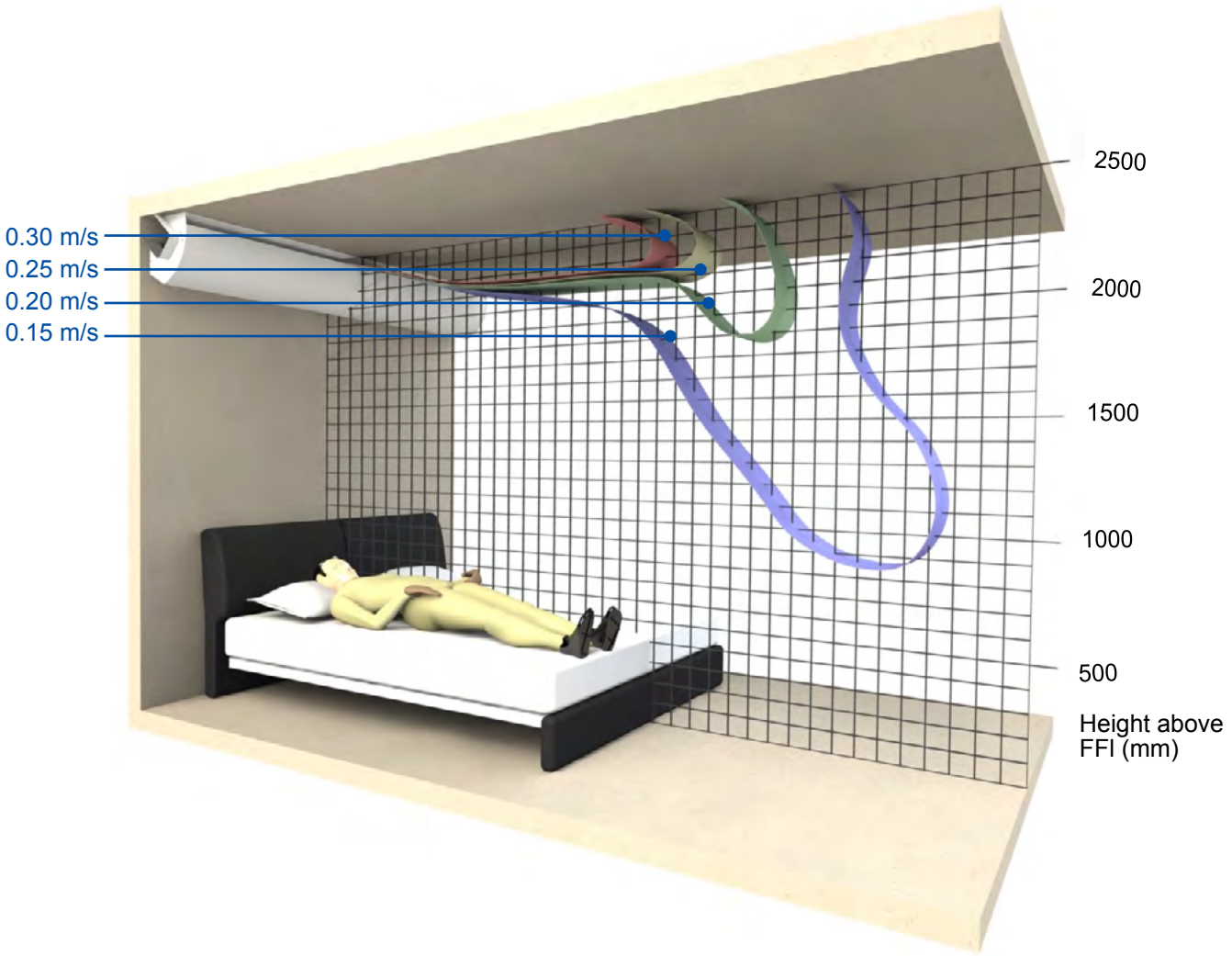
Formula for air cooling effect: P = m x Cp x Δt
Where:
m = mass flow
Cp = specific heat capacity [J/(kg•K)]
qp = air flow [l/s]
Δt = the difference between the temperature of the room and the temperature of the supply air [K].
It is usuallt m x Cp ≈ qp x 1.2



Air cooling effect as a function of airflow. For example, if the air flow is 30 l/s and the under-temperature of the supply air is Δt_{ra} = 8K, the cooling effect from the graph is 290W.

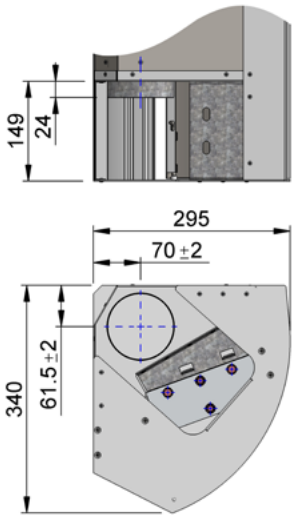
Scatter Diagram

Fresh Air Volume 16 l/s/m @ 80Pa (Short Throw)

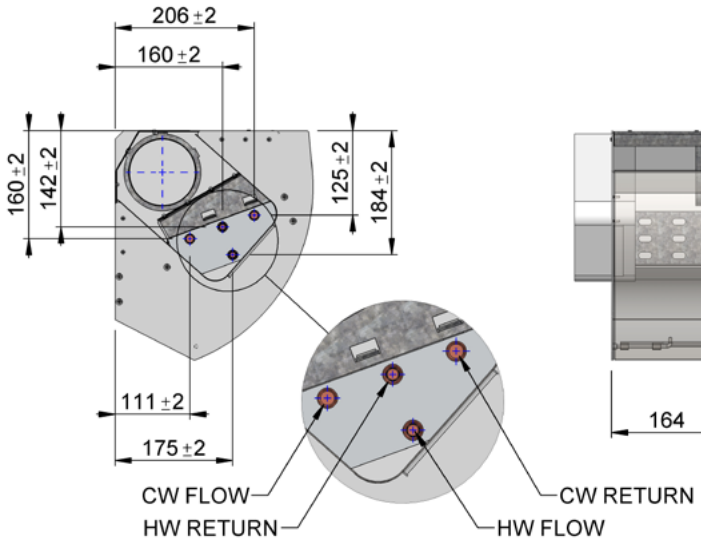


Product Dimensions

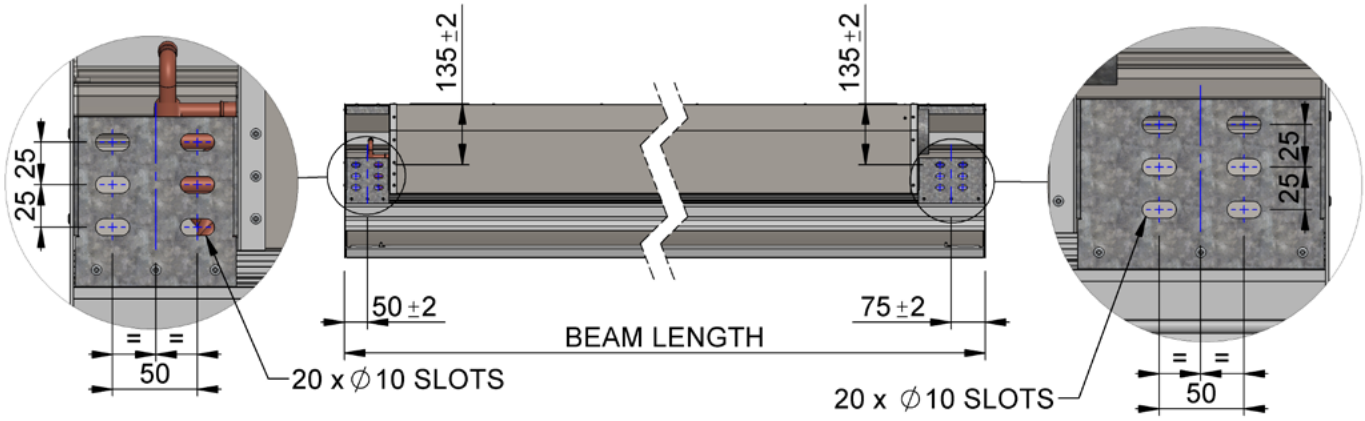
Air Connection

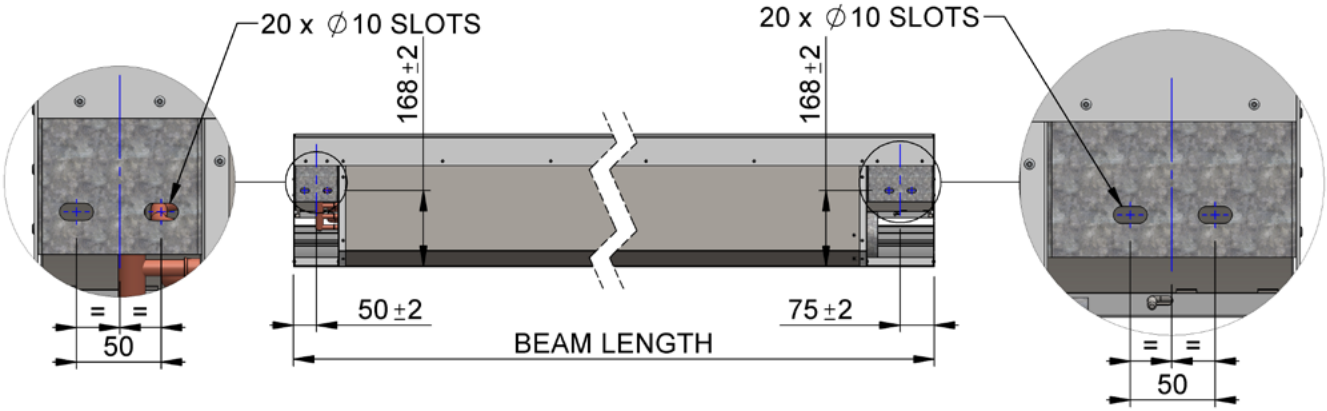


Water Connection

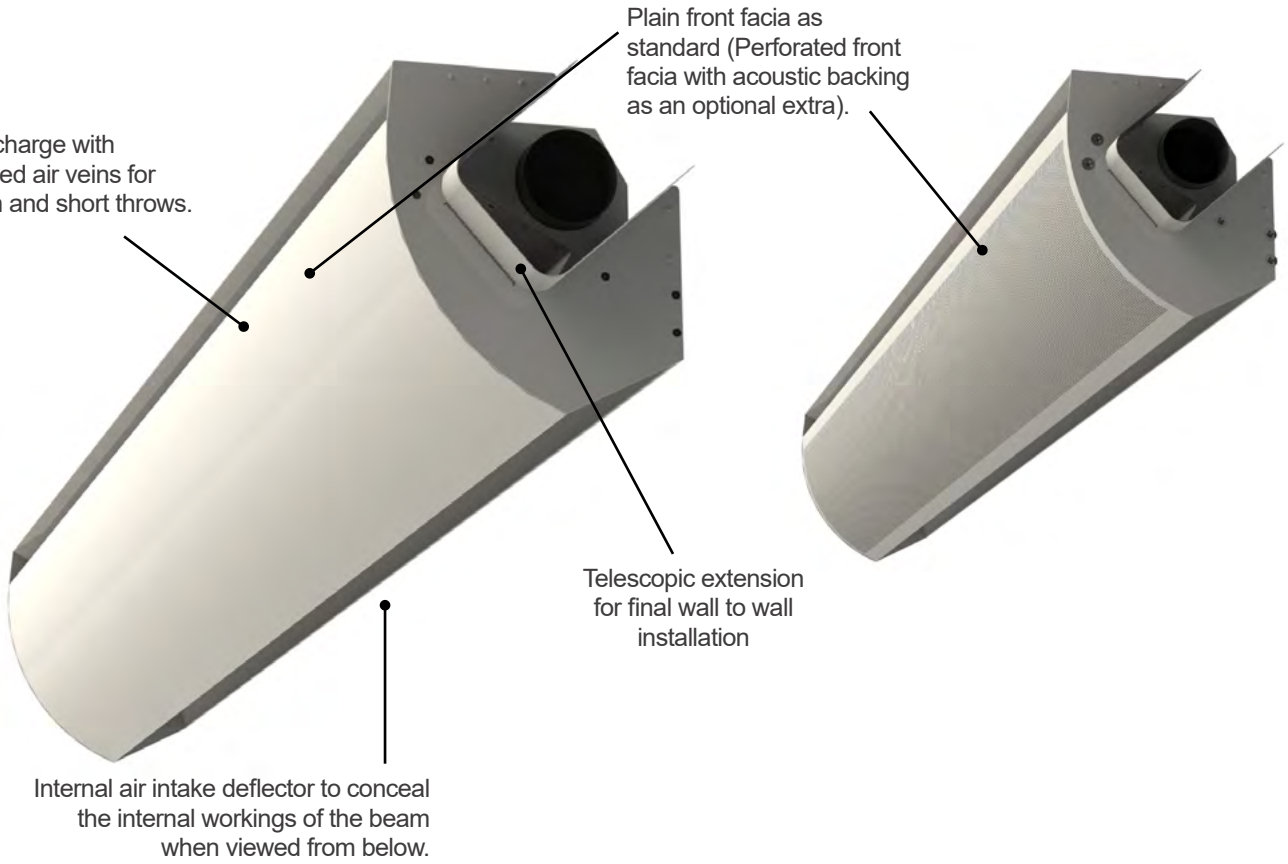


Mounting Details

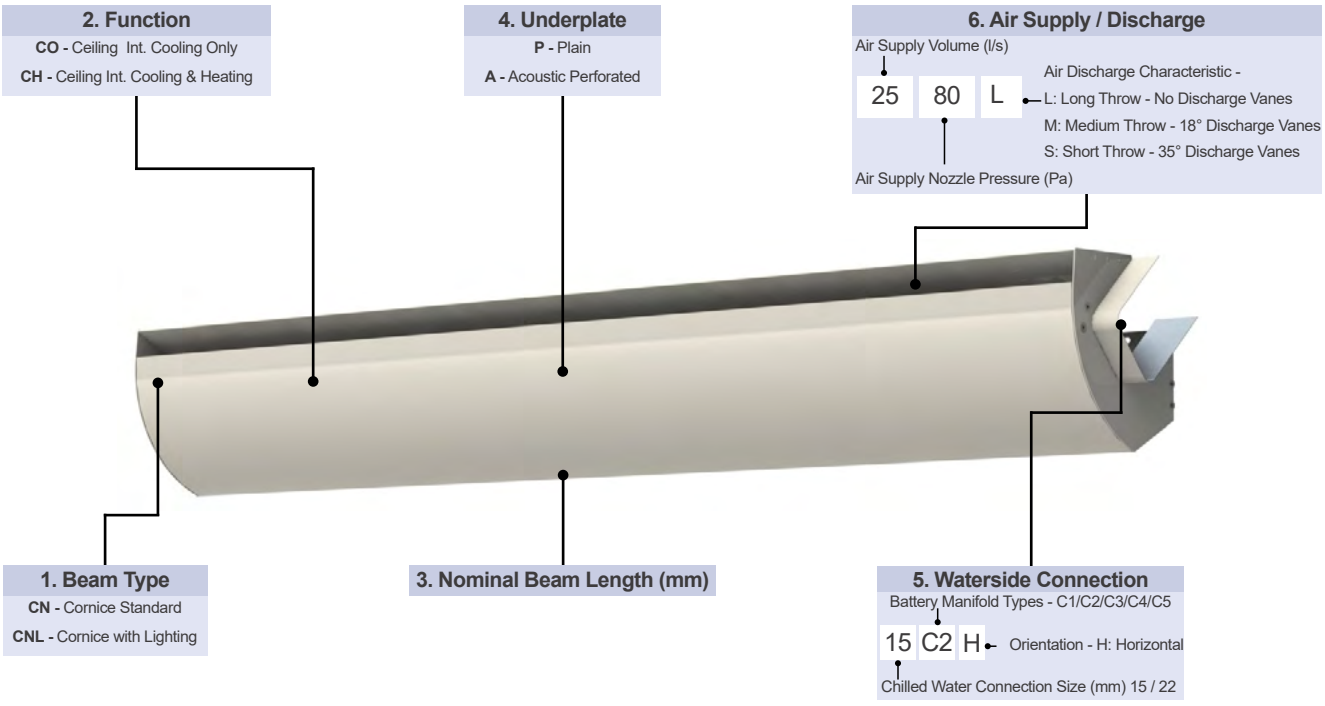




Product Options



Product Ordering Codes



Example:

CN	CH	2400	P	- H	15C2H	2580L
1	2	3	4		5	6

Calculation Programme

Active Chilled Beam Calculation Tool

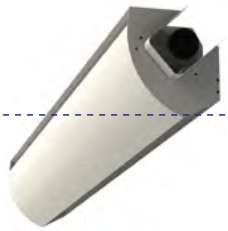
FRENGER systems

Is this the latest version?

version 1.8.1

Project Ref.

Cornice Active Beam Data		
Air Connection	1x100	mm
Product Overall Length	3.6	m
Manifold Type	C4	
Air Discharge Throw	L	
Nozzle Static Pressure	80	Pa
Fresh Air Supply Volume	40	l/s
Heating Funtion	Yes	
Underplate Perforation Type	43% OBR	



Design Conditions	Cooling		Heating	
Flow Water Temperature	14.0	°C	50.0	°C
Return Water Temperature	17.0	°C	40.0	°C
Air Supply Temperature	16.0	°C	19.0	°C
Average Room Condition	24.0	°C	21.0	°C
Thermal Gradient	0.7	°C		
Room Relative Humidity	45.0	%		

Dimensional Data		
Width x Depth	592 x 145	mm
Overall Length	3592	mm
Water Volume	4.1	l
Dry Weight	65.7	kg
CW Connetion	Ø22	mm
LTHW Connection	Ø15	mm

Performance Data	Cooling		Heating	
Room - Mean Water dT	8.50	K	24.0	K
Air On Coil - Mean Water dT	9.20	K	21.1	K
Waterside Performance	1868	W	1183	W
Water Mass Flowrate	0.149	kg/s	0.028	kg/s
Waterside Pressure Drop	25.7	kPa	5.0	kPa
Airside Performance	418	W	-96.0	W
Total Sensible Performance	**2286**	**W**	**1087.5**	**W**
Sound Effect LW	< 35	dB(A)		

Design Check (Warnings)		
Supply Air	OK	
Cooling Circuit	OK	
Heating Circuit	OK	
Turn Down Vol @ 40Pa	28.3	l/s
Calculated Dew Point	11.3	°C

Model Ref: CNCH2400P-H15C2H-2580L

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 coefficent.

2) Pressure drop calculations are based upon CIBSE guides using clean potable water and exclude any additional looses associated with entry / exit losses, pipe fouling or changes in water quality; it is the system engineer's responsibility to use good engineering practice.

Cornice Active Beam Data		
Air Connection	1x100	mm
Product Overall Length	3.6	m
Manifold Type	C4	
Air Discharge Throw	L	
Nozzle Static Pressure	80	Pa
Fresh Air Supply Volume	40	l/s
Heating Function	Yes	
Underplate Perforation Type	43% OBR	

The FTF Group's calculation programme for Cornice is extremely user friendly.

"Manifold types" can be changed in the drop down menu for increased waterside cooling effect, however attention needs to be taked regarding resultant pressure drops (hydraulic resistance). If pressure drops need reducingm 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).

Design Conditions	Cooling		Heating	
Flow Water Temperature	14.0	°C	50.0	°C
Return Water Temperature	17.0	°C	40.0	°C
Air Supply Temperature	16.0	°C	19.0	°C
Average Room Condition	24.0	°C	21.0	°C
Thermal Gradient	0.7	°C		
Room Relative Humidity	45.0	%		

Complete your project data in the "Design Conditions" section. Please note that the "Air On" Thermal Gradient should not be used in normal instances unless placed above a window - seek technical advice from the FTF Group.

Performance Data	Cooling		Heating	
Room - Mean Water dT	8.50	K	24.0	K
Air On Coil - Mean Water dT	9.20	K	21.1	K
Waterside Performance	1868	W	1183	W
Waterside Mass Flowrate	0.149	kg/s	0.028	kg/s
Waterside Pressure Drop	25.7	kPa	5.0	kPa
Airside Performance	418	W	-96.0	W
Total Sensible Performance	**586**	**W**	**1087.5**	**W**
Sound Effect Lw	<35	dB(A)		

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

Finally, the "Design Check" should read "OK" in green, or detail some warning in red.
Calculation programmes for Cornice are available upon request.

Contact our technical department or complete an application form found at www.ftfgroup.us from the relevant link on our homepage.

Project Specific Testing Facility

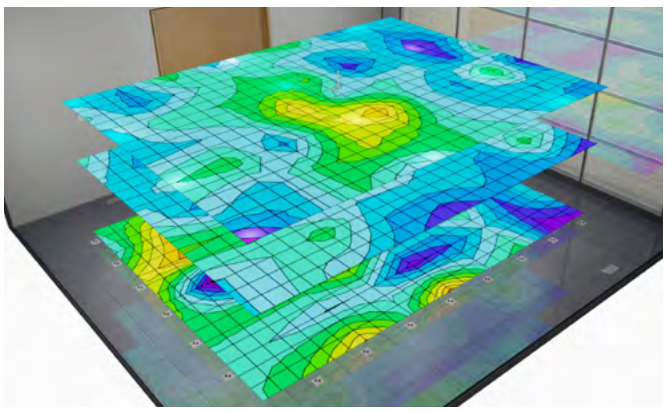
The FTF Group have 3 number state-of-the-art Climatic Testing Laboratories at one of its subsidiary companies predominantly situated at the prestigious Pride Park, Derby, UK. Each laboratory has internal dimensions of 6.3m (L) x 5.7m (W) x 3.3m (H) and includes a thermal wall so that both core and perimeter zones can be modelled. The test facilities are fixed in overall size and construction therefore simulation of buildings specific thermal mass therefore cannot be completed, it should, however be noted that a specific project can be simulated more accurately by recessing the flooe and reducing the height as 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 modelling 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.

Photometric Testing Facility

The FTF Groups 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 of 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 chosed then published Lamp manufacturer’s data is used to calculate actual lighting levels in a design.

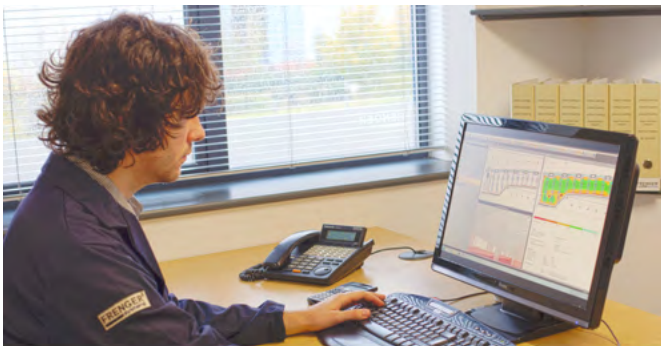
The intensity distribution is obtained by the use of a Goniophotometer to measure the intensity of light emitted from the surface of the fitting at pre-determined angles. The light intensity is measured using either a photometer with corrective spectral response filter to match the CIE standard observer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

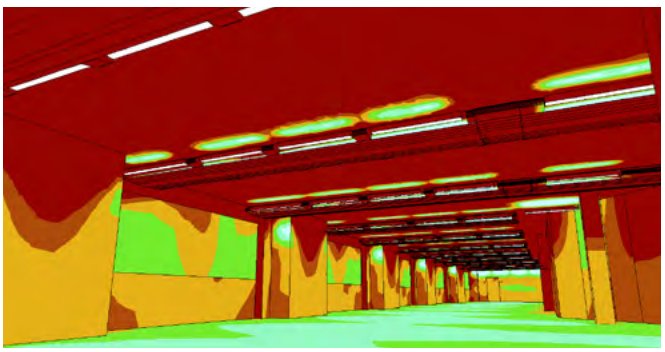
Luminaire outputs are measured using out integrating sphere for small luminaires or our large integrator room for large fittings and Multiservice Chilled Beams. For both methods we can use traceable calibrated radiant flux standards for absolute comparisons.

All tests use appropriate equipment to measure and control all 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 suppling 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 technical 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 LED’s 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 junstion temperatures.





Acoustic Testing Facility

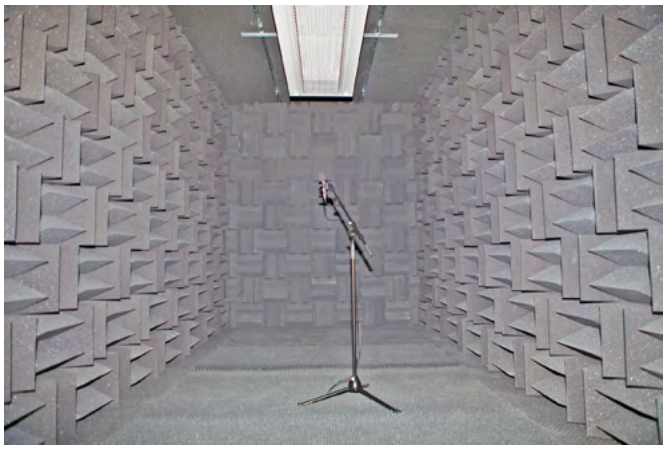
The Acoustic Test Room at the FTF Groups Technical Facility is a hemi-anechoic chamber which utilises sound absorbing acoustic foam material in the shape of wedges to provide an echo free zone for acoustic measurements; the height of the acoustic foam wedges has a direct relationship with the maximum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

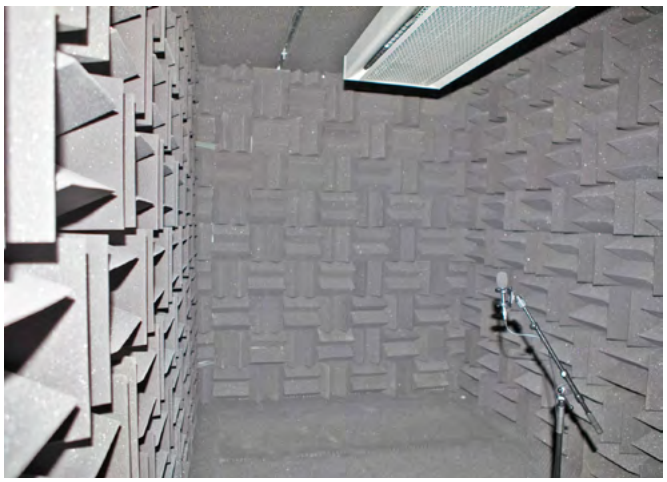
The use of acoustics absorbing material within the test room provides the simulation of a quiet open space without “reflections” which helps to ensure sound measurements from the sound source are accurate, in addition the acoustic material also helps reduce external noise entering the test room meaning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

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

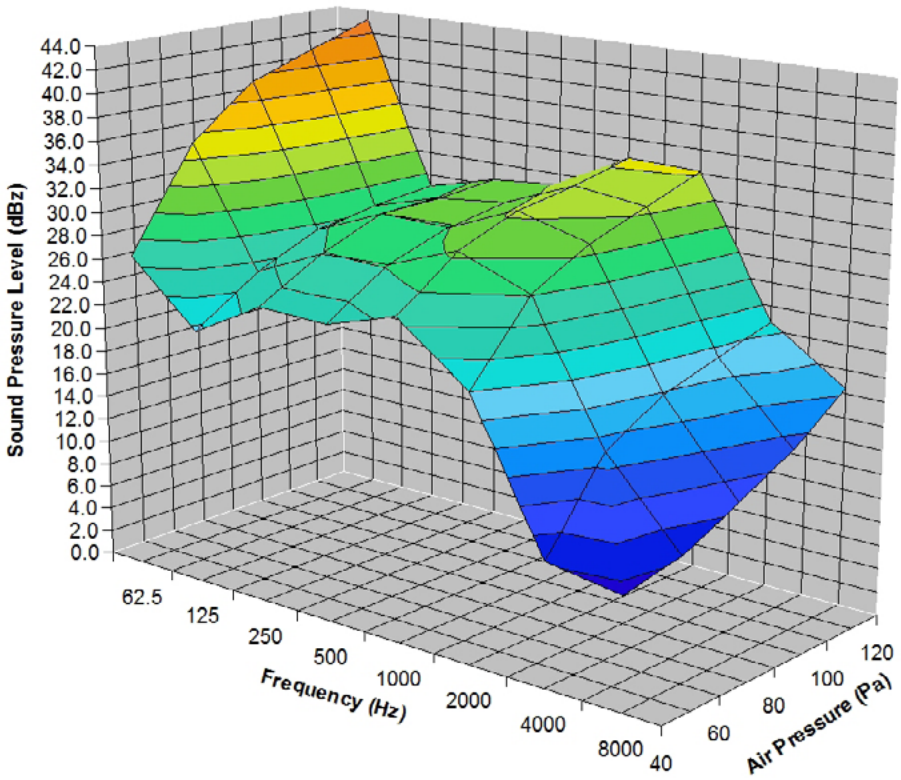
To ensure accuracy the FTF Group only use Class 1 measurement equipment which allows sound level measurements to be taken at 11 different ⅓ octave bands between 16 Hz to 16 kHz, with A, C and Z (un-weighted) simultaneous weightings.

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





Unweighted Sound Pressure Level



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