the future of space conditioning

Compact™

active chilled beam

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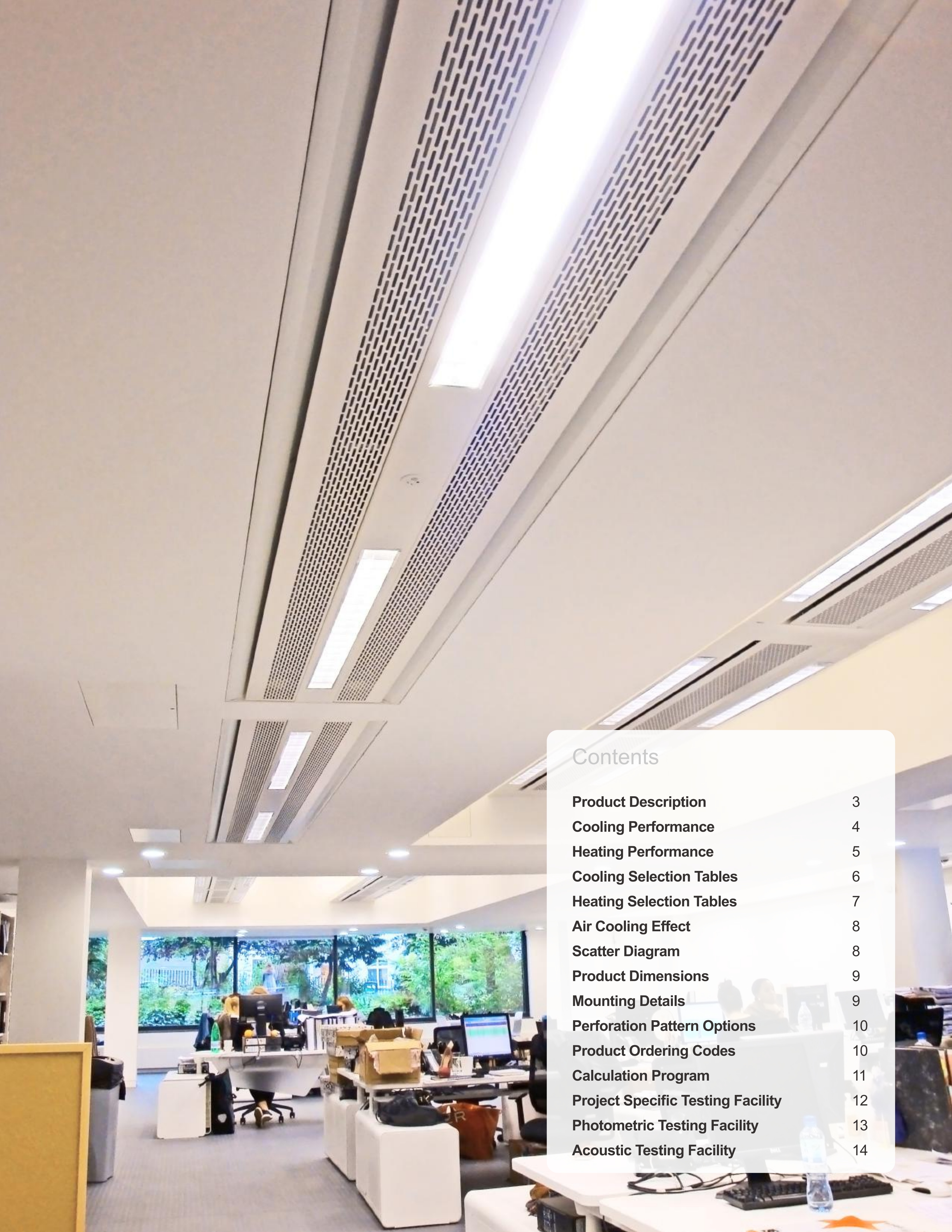
FTF GROUP® Climate



Contents

Product Description

Compact 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 Groups Chilled Beam Technology.

Compact is only 5.2" deep and can achieve up to **1175 BTU / hr / ft total cooling** (based on 18dTF and 16 CFM / ft for a 6ft long beam, supplied at 60°F with a 0.4 inH_2O).

The Compact beam contains a number of **Patented performance enhancing features** and as can be expected from the FTF Group brand, the Compact 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 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 longer lengths, even up to 11ft 8".

Compact beams all have a "closed back", this means 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 Compact it typically 4-5 times that of the supply air (fresh air) rate.

The Compact Chilled Beam outer casing is constructed from extruded aluminum and zintec pressed steel. The casing facilitates an aluminum burst nozzle strip (project specific) and a high performance heat exchange battery constructed from copper and aluminum. Beams are available in lengths from 4ft up to 11ft 8" in 4" increments. Typically 2ft wide (1.6ft wide is also available).

In addition to Compact's high cooling performance capability of in excess of 1100 BTU / hr / ft, **Compact can operate well and induce at low air volumes, as little as 2 CFM / ft and even with a low static pressure of just 0.16 inH_2O. Likewise Compact can handle high air volumes up to 18 CFM / ft and up to 0.48 inH_2O**. 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 compliance to BS EN 7730.

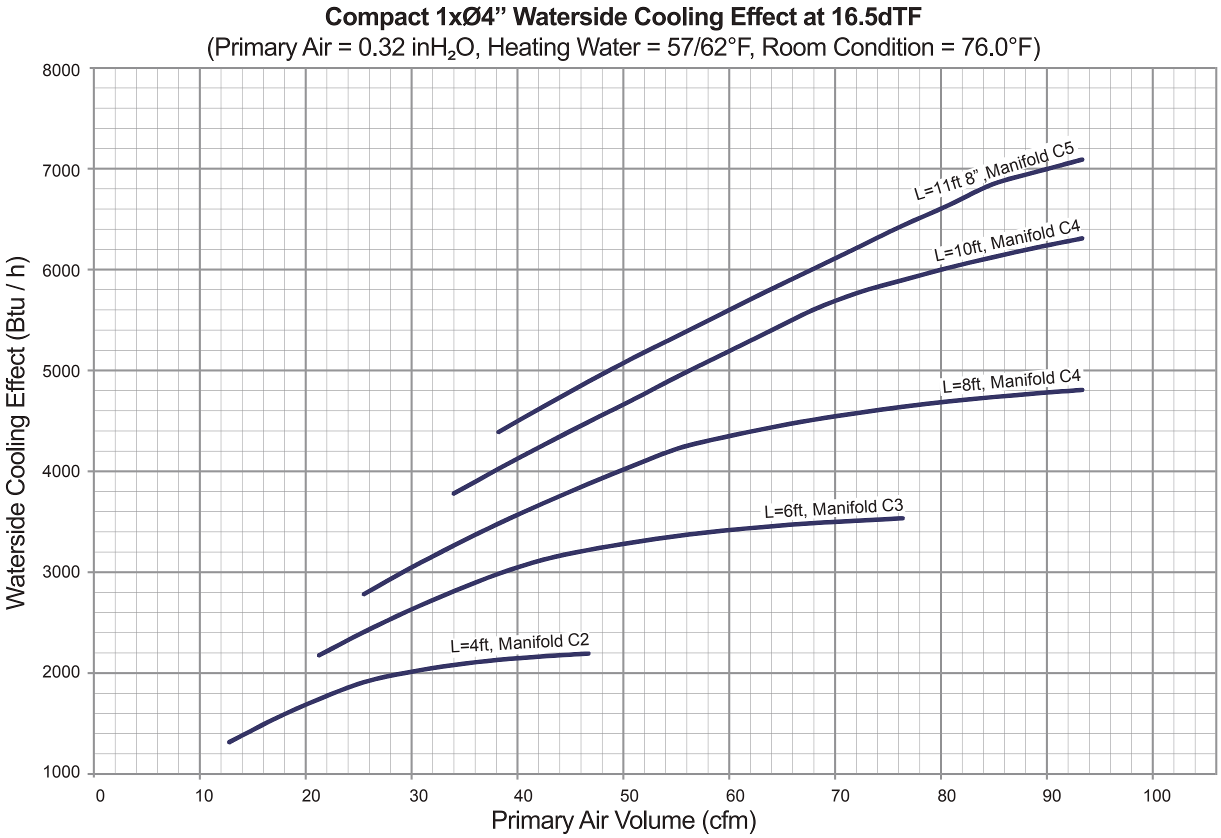
Compact can have integrated heating with separate connections (2 pipe connections for cooling and 2 pipes for heating).

The maximum total supply air for the product is limited to 106 CFM. If the total air volume is more than 106 CFM or if you require increased heating performance, refer to the Ultima™ or Eco™ range of Active Chilled Beams by the FTF Group. Visually both units appear identical from the underside.

At a glance

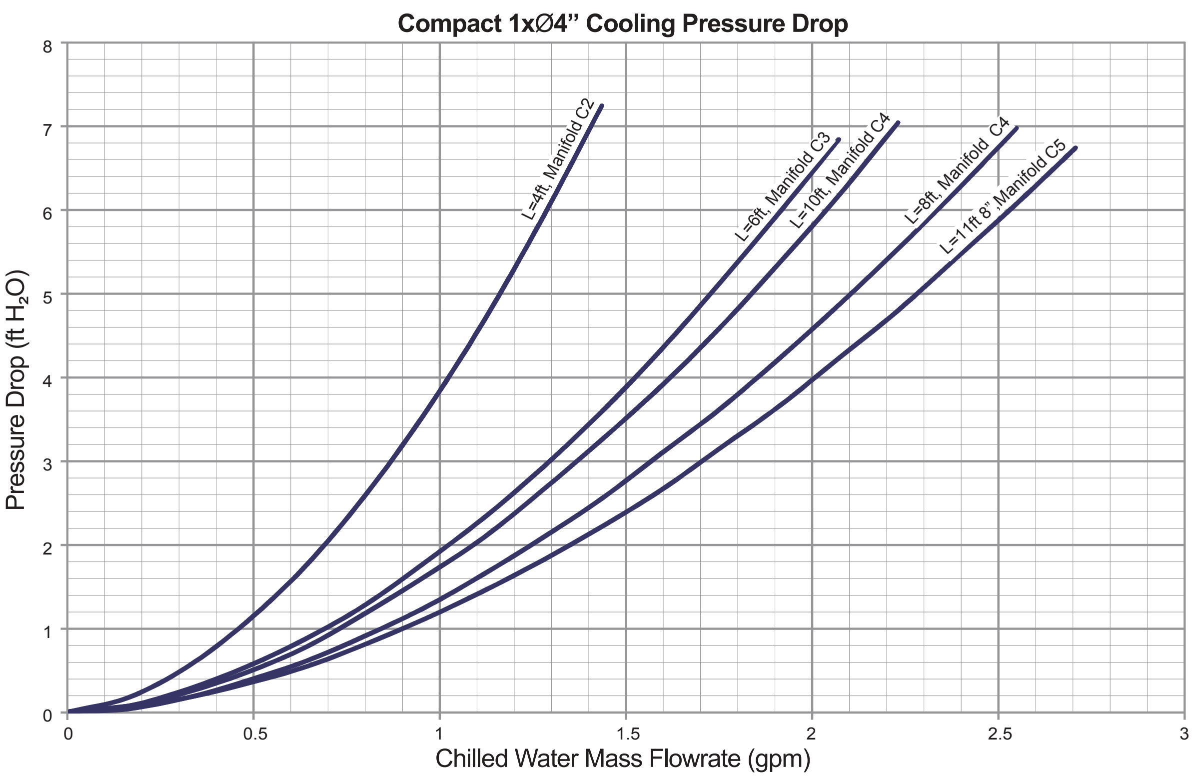
- Shallow depth **(only 5.2")**.
- High output **(1175 BTU / hr / ft)**.
- Optimize discharge nozzle sizes and pitch factory set to best suit project requirements.
- Coanda effect is initiated within the beam.
- Smooth curved discharge slot as opposed to traditional faceted discharge slots for improved aesthetics.
- 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.**

Cooling Performance



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

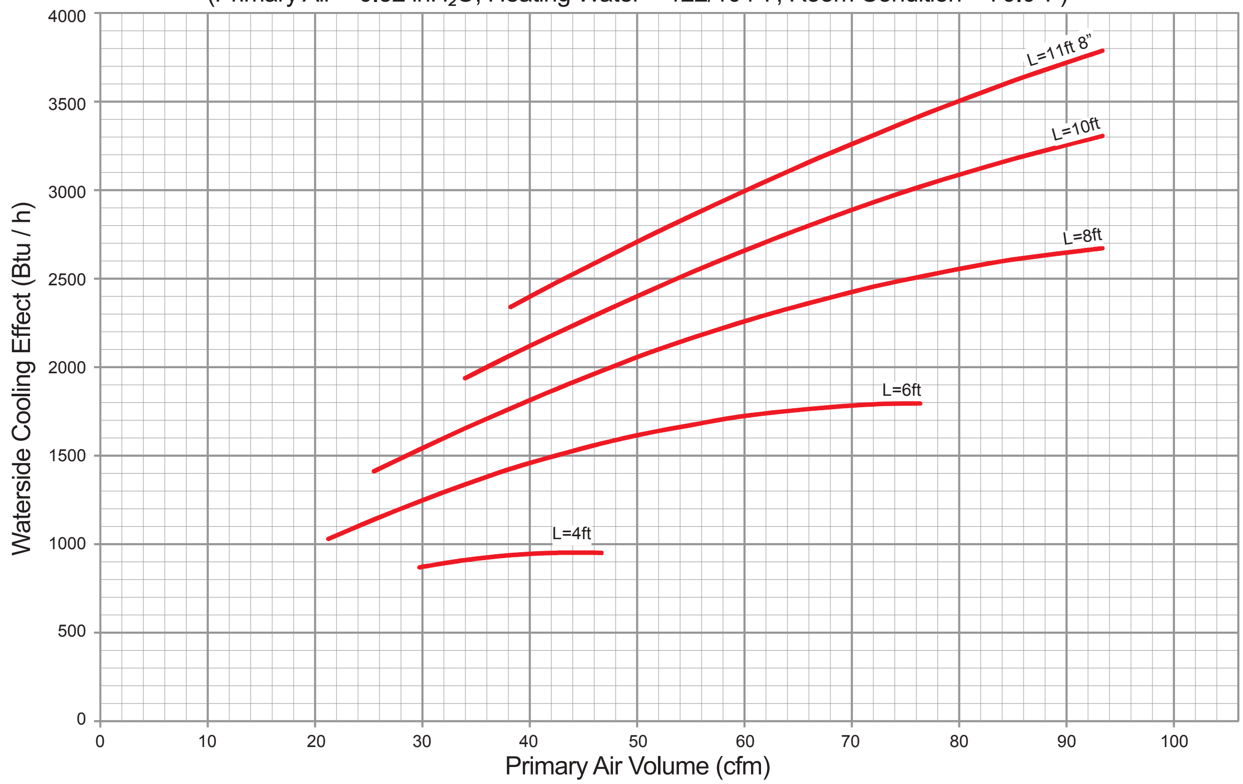
Pressure Drop



Heating Performance

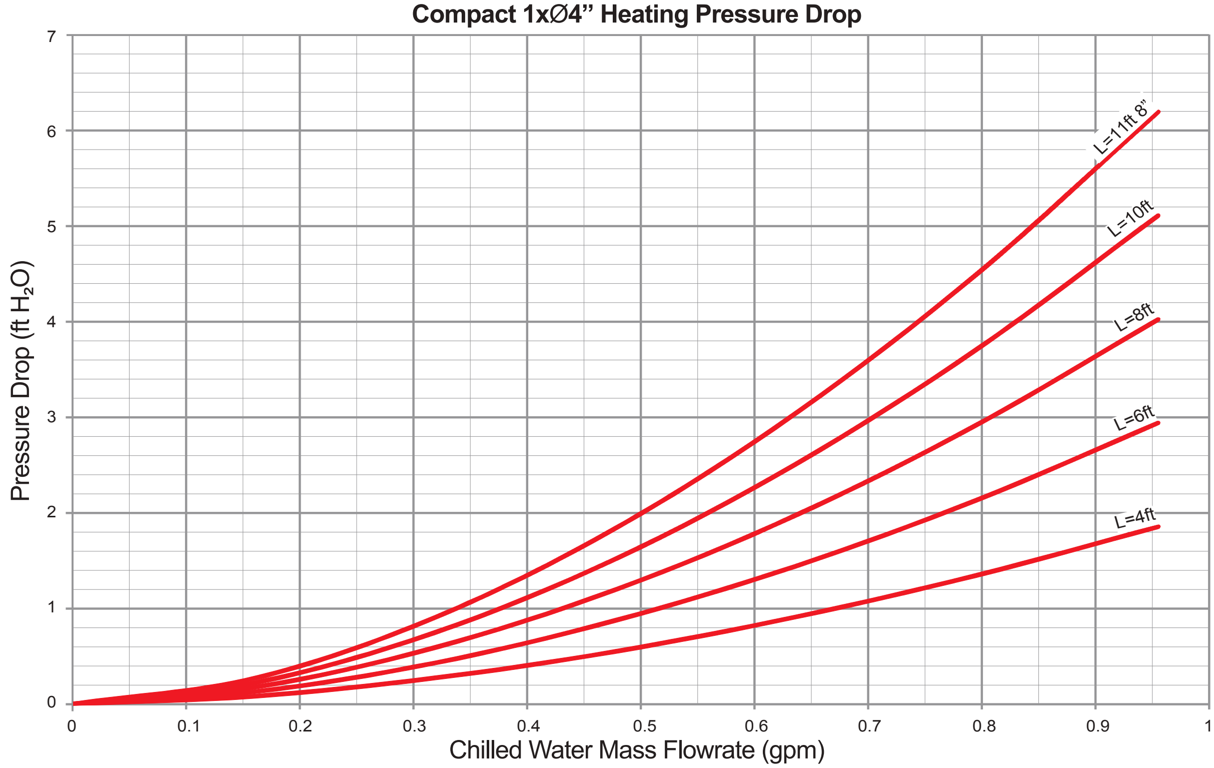
Compact 1xØ4" Waterside Heating Effect at 43dTF

(Primary Air = 0.32 inH_2O, Heating Water = 122/104°F, Room Condition = 70.0°F)



Pressure Drop

Compact 1xØ4" Heating Pressure Drop



Cooling Selection Tables

Cooling at 0.24 Nozzle Pressure

Nozzle Pressure 0.24 inH$_2$O		Water															
(CFM)	Compact	ΔtK - 12.5°F				ΔtK - 14.5°F				ΔtK - 16.5°F				ΔtK - 18.5°F			
	L (ft)	P (btu/h)	P (gpm)	Manifold	P (ft H$_2$O)	P (btu/h)	P (gpm)	Manifold	P (ft H$_2$O)	P (btu/h)	P (gpm)	Manifold	P (ft H$_2$O)	P (btu/h)	P (gpm)	Manifold	P (ft H$_2$O)
42	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	1935	0.773	C2	3.48	2350	0.939	C2	4.88	2799	1.118	C2	6.50	2916	1.164	C3	2.27
	8.0	2232	0.892	C3	1.99	2710	1.083	C3	2.80	3197	1.277	C3	3.73	3720	1.485	C3	4.80
	10.0	2598	1.038	C3	3.35	3137	1.256	C3	4.65	3723	1.487	C3	6.17	4015	1.603	C4	3.77
	11.8	2841	1.136	C3	4.65	3437	1.373	C3	6.43	3819	1.525	C4	4.09	4390	1.753	C4	5.23
62	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	2148	0.859	C2	4.18	2575	1.209	C2	5.82	2813	1.123	C3	2.10	3250	1.298	C3	2.74
	8.0	2715	1.085	C3	2.75	3293	1.316	C3	3.87	3887	1.552	C3	5.16	4533	1.810	C3	6.63
	10.0	3302	1.320	C3	4.94	3740	1.494	C4	3.25	4419	1.765	C4	4.34	5144	2.054	C4	5.59
	11.8	3437	1.373	C4	3.33	4168	1.665	C4	4.65	4968	1.984	C4	6.20	5400	2.156	C5	4.18
84	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.0	2948	1.178	C3	3.16	3546	1.417	C3	4.44	4139	1.653	C3	5.88	4556	1.819	C4	3.59
	10.0	3747	1.497	C3	6.16	4272	1.707	C4	4.06	5025	2.007	C4	5.42	5538	2.211	C5	3.65
	11.8	4064	1.624	C4	4.38	4957	1.980	C4	6.14	5531	2.209	C5	4.28	6417	2.562	C5	5.52

Flow-adjusted waterside cooling effect table. Cooling circuit Δt = 5°F (Water in-out), nozzle pressure of 0.24 inH$_2$O, 1 x Ø4” air connection.
For green values, a Ø¾” manifold connection size is required.

Cooling at 0.32 Nozzle Pressure

Nozzle Pressure 0.32 inH$_2$O		Water															
(CFM)	Compact	ΔtK - 12.5°F				ΔtK - 14.5°F				ΔtK - 16.5°F				ΔtK - 18.5°F			
	L (ft)	P (btu/h)	P (gpm)	Manifold	P (ft H$_2$O)	P (btu/h)	P (gpm)	Manifold	P (ft H$_2$O)	P (btu/h)	P (gpm)	Manifold	P (ft H$_2$O)	P (btu/h)	P (gpm)	Manifold	P (ft H$_2$O)
42	4.0	1171	0.468	C2	0.89	1466	0.586	C2	1.30	1757	0.702	C2	1.78	2044	0.816	C2	2.32
	6.0	2076	0.829	C2	3.90	2522	1.008	C2	5.48	2696	1.077	C3	1.95	3129	1.249	C3	2.55
	8.0	2441	0.975	C3	2.30	2953	1.180	C3	3.24	3460	1.382	C3	4.31	3981	1.589	C3	5.51
	10.0	2861	1.143	C3	3.97	3416	1.365	C3	5.47	3851	1.538	C4	3.50	4403	1.758	C4	4.47
	11.8	3142	1.256	C3	5.60	3647	1.457	C4	3.77	4238	1.692	C4	4.95	4827	1.927	C4	6.26
62	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	2272	0.908	C2	4.54	2781	1.111	C2	6.37	2954	1.180	C3	2.28	3423	1.367	C3	2.97
	8.0	2898	1.158	C3	3.05	3519	1.406	C3	4.31	4174	1.667	C3	5.75	4492	1.794	C3	3.47
	10.0	3556	1.421	C3	5.65	4055	1.620	C4	3.72	4771	1.905	C4	4.96	5515	2.202	C4	6.37
	11.8	3753	1.500	C4	3.87	4511	1.802	C4	5.38	5098	2.036	C5	3.77	5851	2.336	C5	4.84
84	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.0	3102	1.240	C3	3.43	3776	1.508	C3	4.83	4516	1.804	C3	6.45	4810	1.921	C4	3.89
	10.0	3740	1.495	C4	3.18	4546	1.816	C4	4.49	5382	2.149	C4	6.00	5891	2.352	C5	4.03
	11.8	4380	1.750	C4	4.96	5049	2.017	C5	3.61	5960	2.380	C5	4.84	6906	2.757	C5	6.24

Flow-adjusted waterside cooling effect table. Cooling circuit Δt = 5°F (Water in-out), nozzle pressure of 0.32 inH$_2$O, 1 x Ø4” air connection.
For green values, a **Ø¾”** manifold connection size is required.

Cooling at 0.4 Nozzle Pressure

Nozzle Pressure 0.4 inH$_2$O		Water															
(CFM)	Compact	ΔtK - 12.5°F				ΔtK - 14.5°F				ΔtK - 16.5°F				ΔtK - 18.5°F			
	L (ft)	P (btu/h)	P (gpm)	Manifold	P (ft H$_2$O)	P (btu/h)	P (gpm)	Manifold	P (ft H$_2$O)	P (btu/h)	P (gpm)	Manifold	P (ft H$_2$O)	P (btu/h)	P (gpm)	Manifold	P (ft H$_2$O)
42	4.0	1290	0.516	C2	1.04	1614	0.645	C2	1.51	1933	0.772	C2	2.07	2247	0.897	C2	2.71
	6.0	2218	0.887	C2	4.37	2691	1.075	C2	6.12	2889	1.154	C3	2.19	3347	1.336	C3	2.86
	8.0	2585	1.033	C3	2.54	3122	1.247	C3	3.57	3654	1.459	C3	4.74	4204	1.678	C3	6.04
	10.0	3023	1.208	C3	4.37	3610	1.443	C3	6.01	4071	1.626	C4	3.85	4652	1.857	C4	4.91
	11.8	3328	1.330	C3	6.17	3860	1.542	C4	4.15	4486	1.792	C4	5.46	5011	2.001	C5	3.74
62	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	2488	0.994	C2	5.27	2722	1.088	C3	1.95	3237	1.293	C3	2.65	3749	1.497	C3	3.45
	8.0	3118	1.246	C3	3.45	3782	1.511	C3	4.86	4487	1.792	C3	6.48	4832	1.929	C4	3.92
	10.0	3755	1.501	C3	6.21	4291	1.714	C4	4.10	5040	2.013	C4	5.46	5564	2.221	C5	3.69
	11.8	3967	1.585	C4	4.26	4763	1.903	C4	5.91	5388	2.152	C5	4.15	6179	2.467	C5	5.32
84	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.0	3394	1.357	C3	3.98	4114	1.644	C3	5.56	4527	1.808	C4	3.45	5264	2.102	C4	4.51
	10.0	4048	1.618	C4	3.61	4871	1.946	C4	5.03	5765	2.302	C4	6.72	6371	2.544	C5	4.59
	11.8	4651	1.859	C4	5.51	5315	2.124	C5	3.95	6259	2.500	C5	5.29	7323	2.924	C5	6.91

Flow-adjusted waterside cooling effect table. Cooling circuit Δt = 5°F (Water in-out), nozzle pressure of 0.4 inH$_2$O, 1 x Ø4” air connection.
For green values, a Ø¾” manifold connection size is required.

Heating Selection Tables

Heating at 0.24 Nozzle Pressure

Nozzle Pressure 0.24 H_2O		Water											
Q (CFM)	Compact	ΔtK - 36°F			ΔtK - 45°F			ΔtK - 54°F			ΔtK - 63°F		
	L (ft)	P (btu/h)	P (gpm)	P (ft H_2O)	P (btu/h)	P (gpm)	P (ft H_2O)	P (btu/h)	P (gpm)	P (ft H_2O)	P (btu/h)	P (gpm)	P (ft H_2O)
42	4.0	755	0.190	0.10	1007	0.190	0.10	1258	0.190	0.10	1510	0.190	0.10
	6.0	1246	0.190	0.17	1662	0.190	0.17	2087	0.232	0.23	2520	0.280	0.32
	8.0	1605	0.190	0.24	2117	0.236	0.34	2633	0.293	0.49	3152	0.351	0.65
	10.0	1903	0.212	0.37	2481	0.279	0.58	3064	0.341	0.82	3646	0.406	1.08
	11.8	2117	0.236	0.53	2746	0.306	0.82	3378	0.376	1.15	4005	0.446	1.51
62	4.0	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	1389	0.190	0.17	1857	0.207	0.19	2344	0.261	0.28	2839	0.316	0.39
	8.0	1954	0.217	0.30	2573	0.286	0.48	3198	0.356	0.69	3820	0.425	0.91
	10.0	2359	0.262	0.54	3073	0.342	0.84	3786	0.421	1.18	4491	0.500	1.56
	11.8	2632	0.293	0.78	3409	0.379	1.19	4180	0.465	1.66	4941	0.550	2.18
84	4.0	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	1376	0.190	0.17	1842	0.205	0.19	2334	0.260	0.28	2835	0.315	0.39
	8.0	2133	0.237	0.35	2819	0.314	0.56	3507	0.390	0.81	4187	0.466	1.07
	10.0	2716	0.302	0.69	3535	0.393	1.07	4345	0.483	1.50	5141	0.572	1.97
	11.8	3086	0.343	1.03	3985	0.444	1.57	4869	0.542	2.17	5741	0.639	2.83

Flow-adjust waterside heating effect table. Heating circuit Δt = 18°F (Water in-out), nozzle pressure of 0.24 inH_2O, 1 x Ø4" air connection.

For red values, the flow rate has been adjusted to the recommended minimum flow of 0.19 gpm.

Heating at 0.32 Nozzle Pressure

Nozzle Pressure 0.32 H_2O		Water											
Q (CFM)	Compact	ΔtK - 36°F			ΔtK - 45°F			ΔtK - 54°F			ΔtK - 63°F		
	L (ft)	P (btu/h)	P (gpm)	P (ft H_2O)	P (btu/h)	P (gpm)	P (ft H_2O)	P (btu/h)	P (gpm)	P (ft H_2O)	P (btu/h)	P (gpm)	P (ft H_2O)
42	4.0	837	0.190	0.10	1116	0.190	0.10	1394	0.190	0.10	1673	0.190	0.10
	6.0	1331	0.190	0.17	1775	0.198	0.18	2227	0.248	0.26	2687	0.299	0.35
	8.0	1707	0.190	0.24	2242	0.250	0.38	2786	0.310	0.54	3330	0.371	0.72
	10.0	2012	0.224	0.41	2625	0.292	0.64	3239	0.360	0.90	3849	0.428	1.19
	11.8	2243	0.250	0.59	2913	0.324	0.91	3579	0.398	1.27	4236	0.471	1.66
62	4.0	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	1528	0.190	0.17	2049	0.228	0.23	2589	0.288	0.34	3136	0.349	0.46
	8.0	2091	0.233	0.34	2750	0.306	0.54	3413	0.380	0.77	4072	0.453	1.02
	10.0	2501	0.278	0.60	3253	0.362	0.93	3999	0.445	1.30	4737	0.527	1.71
	11.8	2784	0.310	0.86	3599	0.401	1.31	4402	0.490	1.82	5193	0.578	2.38
84	4.0	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	1546	0.190	0.17	2086	0.232	0.24	2654	0.295	0.35	3228	0.359	0.49
	8.0	2346	0.261	0.42	3100	0.345	0.67	3853	0.429	0.95	4561	0.507	1.25
	10.0	2911	0.324	0.78	3783	0.421	1.21	4643	0.517	1.69	5431	0.604	2.17
	11.8	3279	0.365	1.14	4224	0.470	1.74	5155	0.574	2.40	6006	0.668	3.07

Flow-adjust waterside heating effect table. Heating circuit Δt = 18°F (Water in-out), nozzle pressure of 0.32 inH_2O, 1 x Ø4" air connection.

For red values, the flow rate has been adjusted to the recommended minimum flow of 0.19 gpm.

Heating at 0.4 Nozzle Pressure

Nozzle Pressure 0.4 H_2O		Water											
Q (CFM)	Compact	ΔtK - 36°F			ΔtK - 45°F			ΔtK - 54°F			ΔtK - 63°F		
	L (ft)	P (btu/h)	P (gpm)	P (ft H_2O)	P (btu/h)	P (gpm)	P (ft H_2O)	P (btu/h)	P (gpm)	P (ft H_2O)	P (btu/h)	P (gpm)	P (ft H_2O)
42	4.0	893	0.190	0.10	1191	0.190	0.10	1489	0.190	0.10	1797	0.200	0.11
	6.0	1372	0.190	0.17	1828	0.203	0.203	2286	0.254	0.27	2751	0.306	0.37
	8.0	1741	0.194	0.25	2284	0.254	0.39	2836	0.316	0.56	3389	0.377	0.74
	10.0	2052	0.228	0.43	2677	0.298	0.66	3306	0.368	0.93	3930	0.437	1.23
	11.8	2295	0.255	0.61	2982	0.332	0.94	3667	0.408	1.32	4345	0.483	1.74
62	4.0	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	1624	0.181	0.16	2166	0.241	0.25	2722	0.303	0.37	3282	0.365	0.50
	8.0	2155	0.240	0.36	2821	0.314	0.56	3490	0.388	0.80	4155	0.462	1.06
	10.0	2549	0.284	0.62	3310	0.368	0.96	4066	0.452	1.34	4812	0.535	1.76
	11.8	2834	0.315	0.89	3662	0.408	1.35	4479	0.498	1.88	5284	0.588	2.45
84	4.0	-	-	-	-	-	-	-	-	-	-	-	-
	6.0	1709	0.190	0.17	2307	0.257	0.28	2921	0.325	0.42	3536	0.393	0.57
	8.0	2463	0.274	0.46	3235	0.360	0.72	4004	0.446	1.02	4761	0.530	1.34
	10.0	2991	0.333	0.82	3870	0.431	1.26	4737	0.527	1.75	5591	0.622	2.28
	11.8	3342	0.372	1.18	4297	0.478	1.79	5237	0.583	2.47	6165	0.686	3.21

Flow-adjust waterside heating effect table. Heating circuit Δt = 18°F (Water in-out), nozzle pressure of 0.4 inH_2O, 1 x Ø4" air connection.

For red values, the flow rate has been adjusted to the recommended minimum flow of 0.19 gpm.

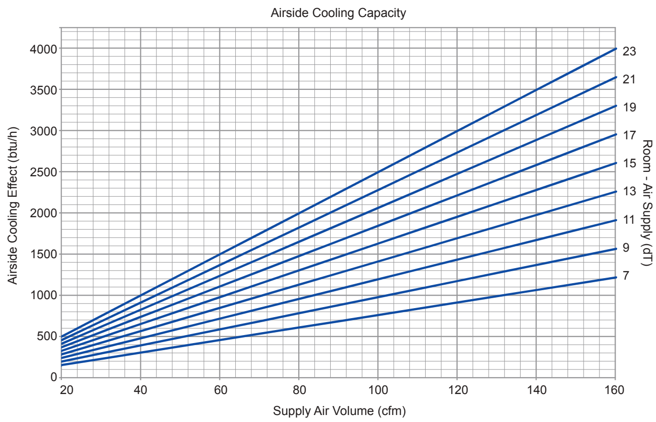
Air Cooling Effect

Cooling effect supplied in the ventilation air

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.

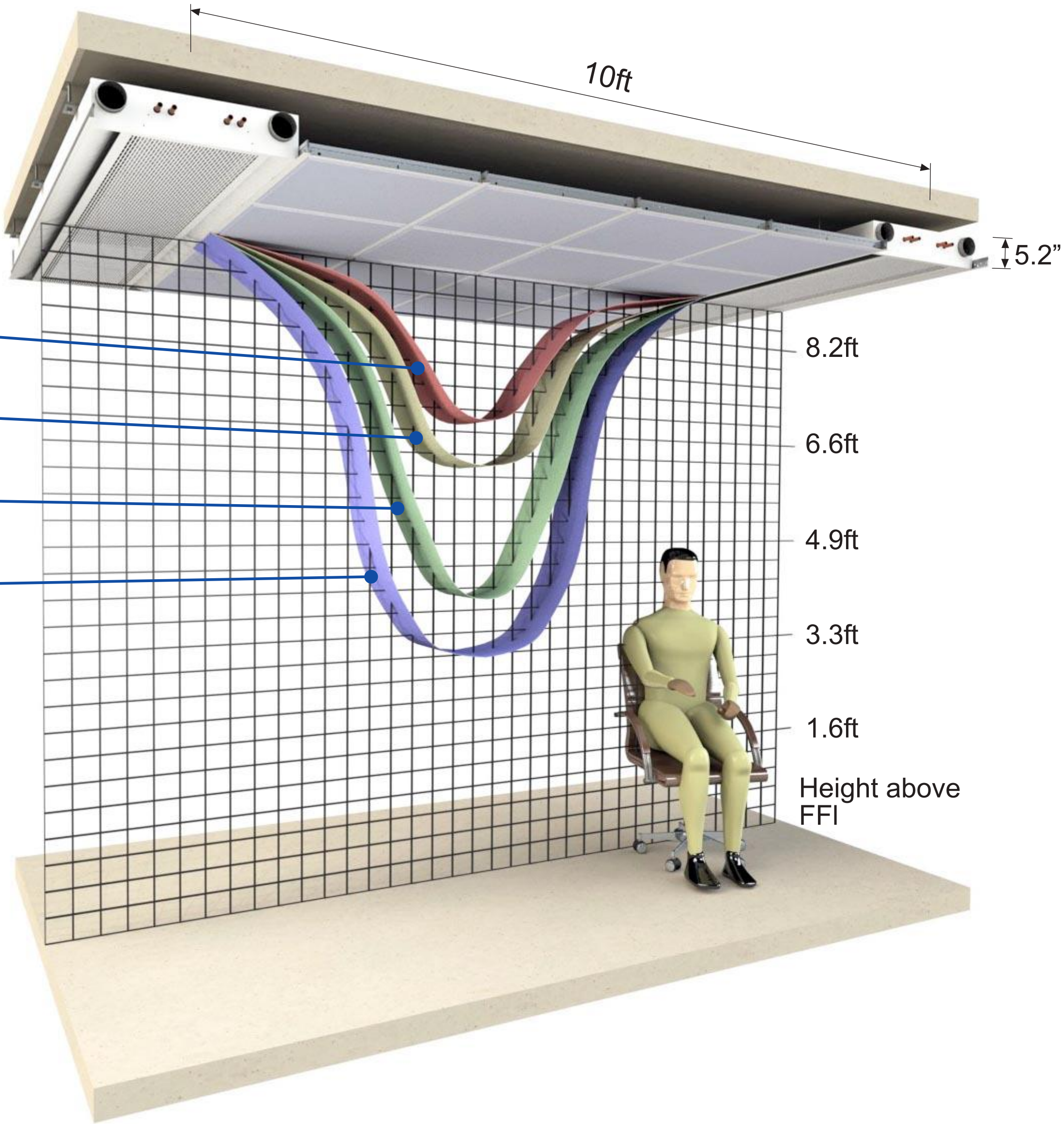
3. The remaining cooling effect has to be supplied by the beam.



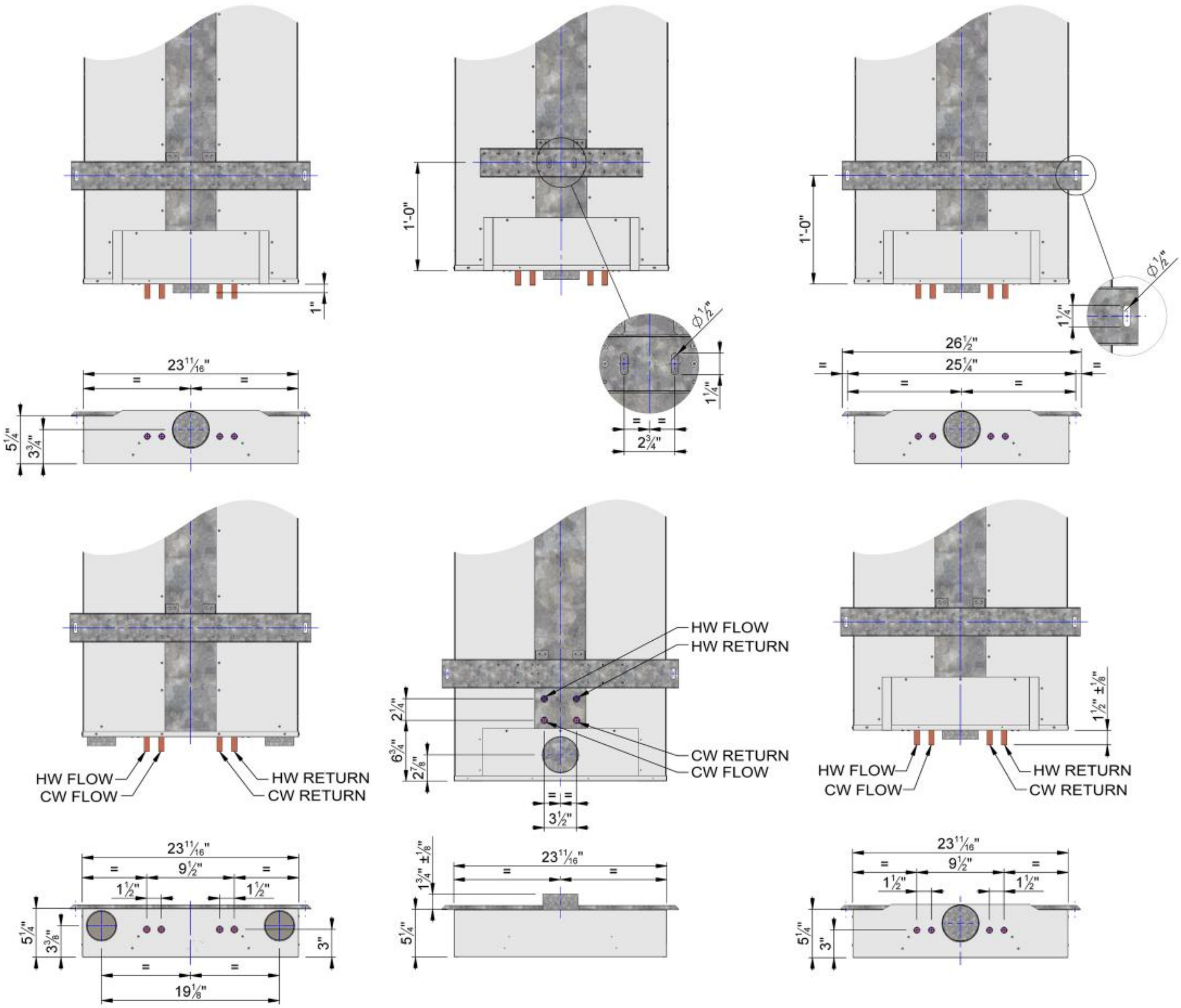
Air cooling effect as a function of airflow.

Scatter Diagram

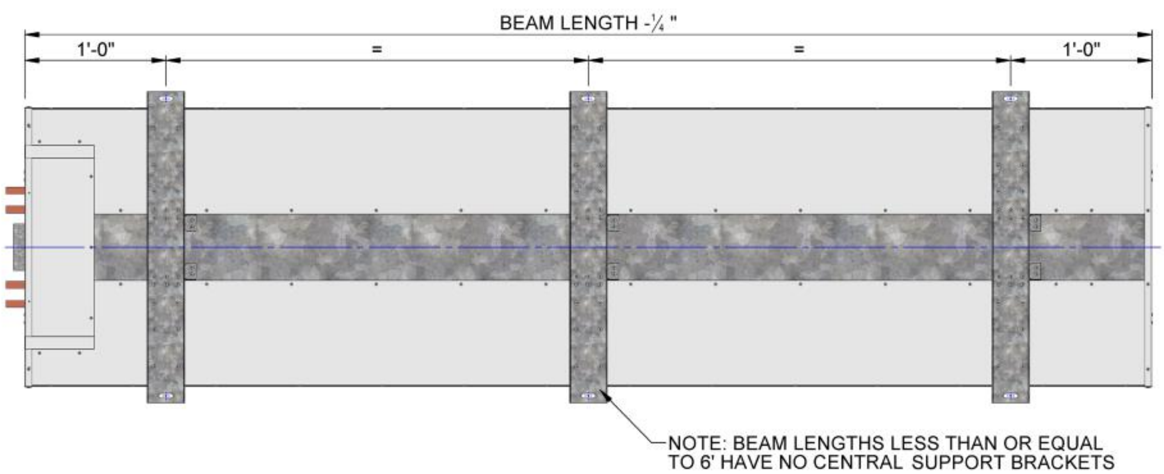
Fresh Air Volume 14 CFM / ft @ 0.3 inH₂O



Product Dimensions

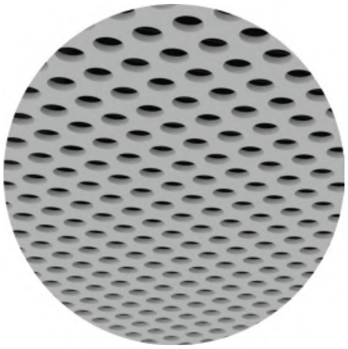


Mounting Details



Perforation Pattern Options

Slot Perforation
45% Free Area



Dot Perforation
33% Free Area

Double Dot Perforation
50% Free Area

Product Ordering Codes

2. Function

CO - Ceiling Int. Cooling Only
CH - Ceiling Int. Cooling & Heating
MO - Multiservice Cooling Only
MH - Multiservice Cooling & Heating

4. Underplate

7D - 7Ø & 4Ø Double Dot / 50% Free Area
4D - 4Ø Dot / 33% Free Area
5S - 5 X 35 Slot / 45% Free Area

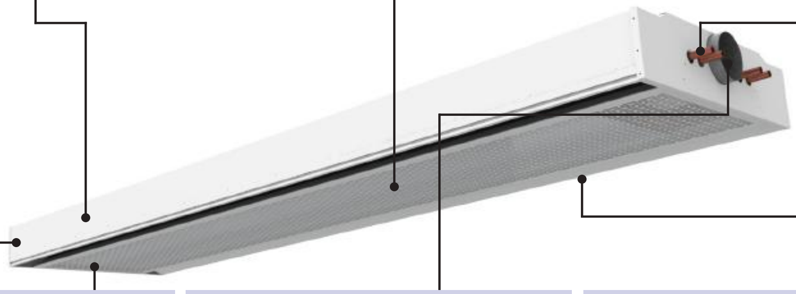
6. Waterside Connection

Battery Manifold Types - C1/C2/C3/C4/C5

1/2 C3 H

Orientation - H: Horizontal / V: Vertical

Chilled Water Connection Size (in) ½" or ¾"



1. Beam Type

CO - Compact

3. Nominal Beam Length (ft / in)

5. Airside Connection

Air Connection Qty

1 x 4 H

Orientation - H: Horizontal / V: Vertical

Air Connection Spigot Size (in) 3" / 4"

7. Air Supply / Discharge

Air Supply Volume (CFM)

40 04 L

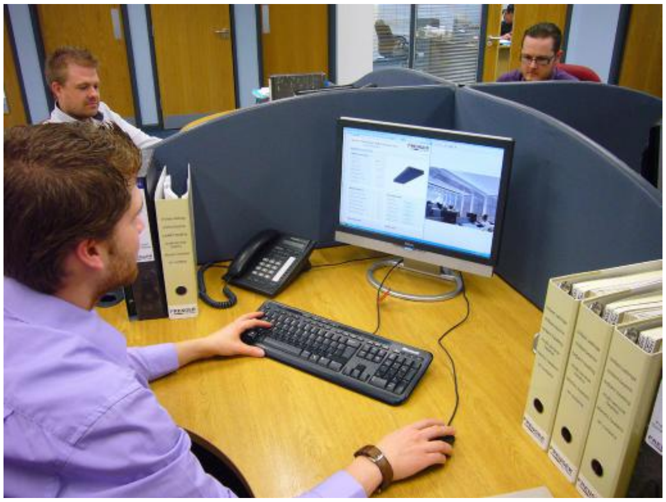
Air Discharge Characteristic -
L: Long Throw - No Discharge Vanes
M: Medium Thrown - 18° Discharge Vanes
S: Short Throw - 35° Discharge Vanes

Air Supply Nozzle Pressure (inH_2O)

Example:

CO	CH	11'08"	7D	-	1 x 4H	1/2C3H	-	4004L
1	2	3	4		5	6		7

Calculation Program



Compact Active Beam Data

Air Connection	1 x 4"	
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 Compact 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 3" 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 Perforated" options can be found on page 10.

Design Conditions	*Cooling*		*Heating*	
Flow Water 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	4132	BTU/Hr	2727	BTU/Hr
Water Mass Flowrate	1.375	gpm	0.303	gpm
Waterside Pressure Drop	2.61	ft H_2O	0.62	ft H_2O
Airside Performance	1653	BTU/Hr	-150	BTU/Hr
Total Sensible Performance	**5786**	**BTU/Hr**	**2577**	**BTU/Hr**
Sound Effect Lw	< 35	dB(A)		

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

Finally, the "Design Check" should read "Ok" in green, or detail some warnings in red.

Calculation programs for Compact are available upon request.

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

Active Chilled Beam Calculation Tool

FTF GROUP® Climate

imperial version 1.8.2

Project Ref.

Compact Active Beam Data

Air Connection	1 x 4"	
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	

EUROVENT CERTIFIED PERFORMANCE

www.eurovent-certification.com

Design Conditions	*Cooling*		*Winter*	
Flow Water 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	%		

Dimensional Data

Width x Depth	2ft x 0.47ft	
Water Volume	0.8	gal
Dry Weight	114.2	lb
CW Connection	Ø½	inch
LTHW Connection	Ø½	inch

Performance Data	*Cooling*		*Heating*	
Room - Mean Water dT	16.0	°F	44.0	°F
Waterside Performance	4132	BTU/Hr	2727	BTU/Hr
Water Mass Flowrate	1.375	gpm	0.303	gpm
Waterside Pressure Drop	7.6	ft H_2O	0.62	ft H_2O
Airside Performance	1653	BTU/Hr	-150	BTU/Hr
Total Sensible Performance	**5786**	**BTU/Hr**	2577	BTU/Hr
Sound Effect Lw	< 35	dB(A)		

Design Check (Warnings)

Air Discharge	OK	
Supply Air	OK	
Cooling Circuit	OK	
Heating Circuit	OK	
Turn Down @ 0.16 "H_2O	59.8	CFM
Calculated Dew Point	56.0	°F

Model Ref: COCH / 9'4" / 5S / 1 x 4"H / Ø½C4H / 70 / 0.22M

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 centers for alternative layouts contact FTF Group Technical Dept for throw settings

Project Specific Testing Facility

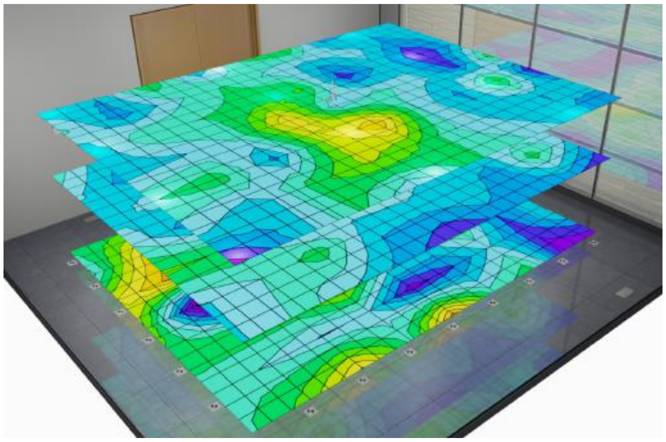
The FTF Group have 3 number state-of-the-art Climatic Testing Laboratories at one if its subsidiary companies predominantly situated at the prestigious Pride Park. Each laboratory has internal dimensions of 20.7ft x 18.7ft x 10.8ft high and includes a thermal wall so that both core and perimeter zones can be modeled. 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 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 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.

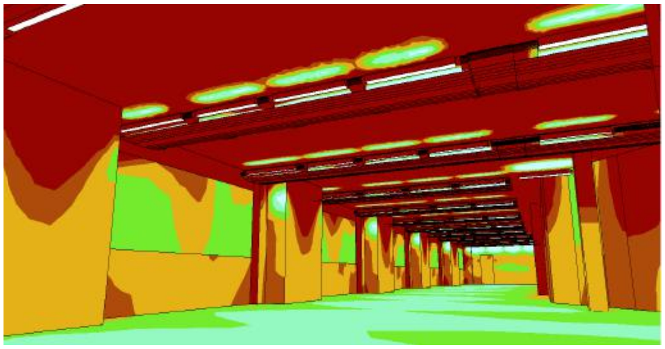
The intensity distribution is obtained by the use of a Goniophotometer to measure the intensity of light emitted from the surface of the fitting at pre-determined angles. The light intensity is measured using either a photometer with a corrective spectral response filter to match the CIE standard observer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

Luminaire outputs are measured using 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 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.

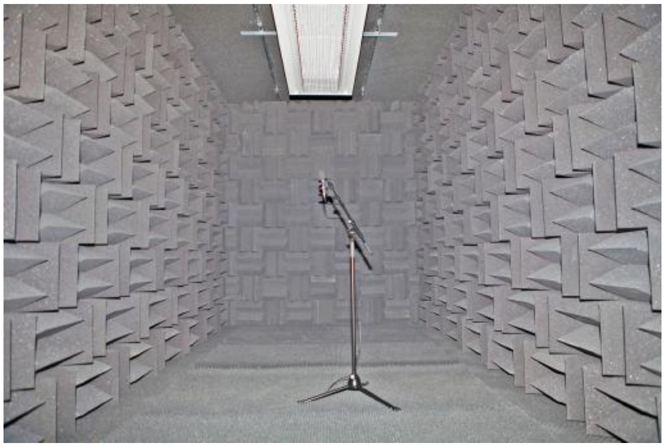
A full test report is compiled and supplied in "locked" PDF format. Data is collected and correlated using applicable software and is presented electronically to suit, usually in Eulumdat, CIBSE TM14 or IESN standard file format.

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 optimize 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 utilizes 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 optimize the sound absorption at the peak frequency normally found with our Active Chilled Beam products.

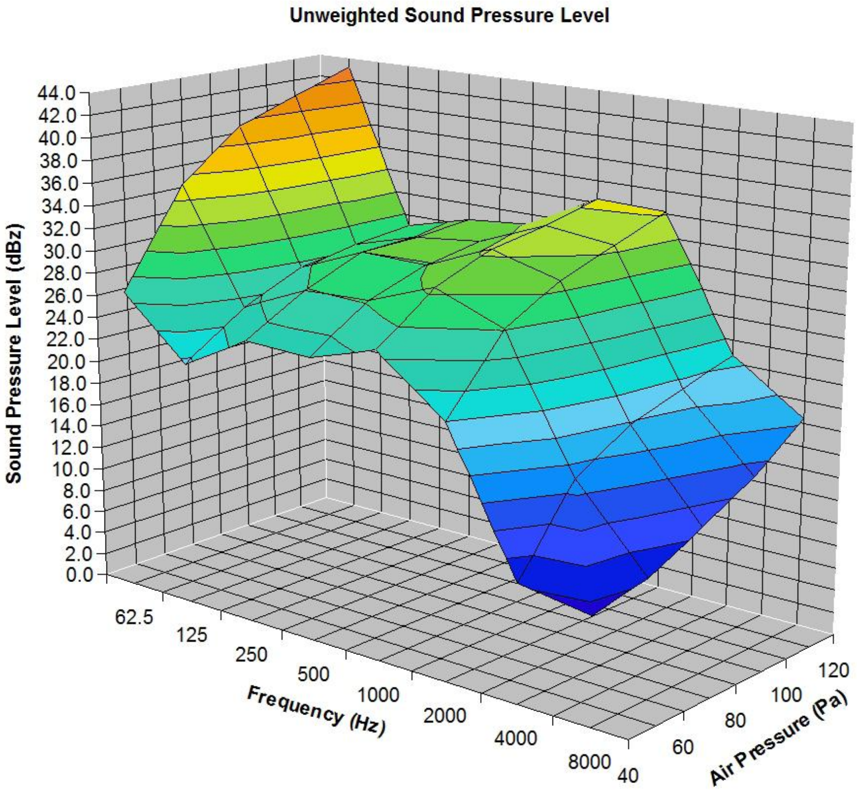


The use of acoustic absorbing material within the test room provides the simulation of a quiet open space without "reflections" which helps to ensure sound measurements from the sound source are accurate, in addition the acoustic material also helps reduce external noise entering the test room meaning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

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 program for Chilled Beams. Check ongoing validity of certificate: www.eurovent-certification.com or www.certiflash.com

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