the future of space conditioning

Halo™

active chilled beam

www.FTFgroup.us

FTF GROUP®
Climate

Contents

Product Description	3
Construction	4
Cooling Performance	5
Heating Performance	6
Cooling Selection Tables	7
Heating Selection Tables	8
Air Cooling Effect	9
Scatter Diagram	9
Product Dimensions	10
Mounting Details	10
Perforation Pattern Options	11
Product Ordering Codes	11
Calculation Program	12
Project Specific Testing Facility	13
Photometric Testing Facility	14
Acoustic Testing Facility	15

Product Description

Halo 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.

Halo is only 9.1" deep and can achieve up to **5158 BTU/hr total cooling** (based on a 4ft long beam with a 18 dTF between room and mean water temperature and 94 CFM of air 60°F with a 0.4in$H_2$0).

The Halo beam contains a number of **Patented performance enhancing features** and Registered Designs for aesthetic enhancements, all as can be expected from the FTF Group's brand.

These high-capacity active chilled beams have a small footprint and as such have become increasingly popular as they can free up ceiling area whilst still handling significant heat gains and heat losses. However, the challenge has been to meet these demands whilst still delivering high levels of occupancy comfort. The FTF Group's Halo active chilled beam meets these challenges with its unique, true 360° air discharge characteristic with concealed air discharge veins.

The latest-generation of 360° Active Chilled Beam combines cooling and optional heating function with a revolutionary air discharge system and pattern. By introducing the air with set back air deflector veins further up into the point of discharge rather than being mounted on the underplates like earlier models, this not only improve the 360° diffusion pattern it also vastly improves the products aesthetics. This latest development is a Registered Design in addition to the Patented performance enhancing items by the FTF Group. When compared to traditional 2-way or 4-way discharge pattern by others, Halo can deliver a reduction in air velocities of up to 35%.

This optimal method of spreading the air in all directions means the shortest possible air throws are created, resulting in optimal levels of comfort to building occupants.

Halo 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

- Halo is only 9.1" deep and can achieve up to 5158 BTU/hr total cooling.
- High-capacity active chilled beams with a small footprint.
- True 360° air discharge characteristic.
- Concealed air discharge veins.
- Spreading the air in all directions means the shortest possible air throws are created.
- Halo is offered in 3 standard models; "I", "C" and "F":
  - Halo "I" models are for integrated ceiling installation.
  - Halo-"C"-60 and Halo-"C"-120 are designed for integration into metal clip-in ceiling systems.
  - Halo "F"-60 is designed for free-hanging exposed applications.
- Providing a comfortable environment, compliant to BS EN ISO 7730 / ASHRAE 55.

Construction

Halo is offered in 3 standard models; “I”, “C” and “F”.

Halo “I” models are for integrated ceiling installation in standard 0.6” or 0.9” exposed tee bar grids (Lay-In grid systems) replacing 23.6” x 23.6”or 47.2” x 23.6” tile modules and can be used for integration with either “mineral fiber” tiles or plaster board ceilings.

Halo-“C”-60 and Halo-“C”-120 are designed for integration into metal clip-in ceiling systems.

Halo “F”-60 is designed for free-hanging exposed applications. This is a standard model with an addition factory fitted architectural frame enhancement kit that can be finished in white to match the Halo beam, or provided as a different color to make a feature of the extruded aluminum outer frame.

Fig 2. Halo™ Active Chilled Beam 4ft x 4ft Module.

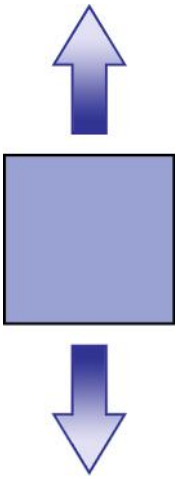
Introduction

In addition to the flexibility offered by a modular designed small unit, Halo has been designed to deliver the most comfortable environment at any given air volume. Traditional active chilled beams with a 1-way or 2-way throw have the potential to throw air at high velocities over long distances, however this may result in low comfort levels – particularly where the air streams from adjacent beams meet and fall downwards into the occupied zone or where beams are located close to walls or partitions.

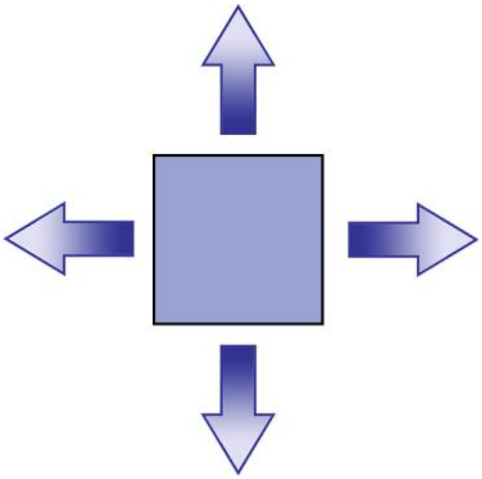
Beams with a 4-way throw help to alleviate this problem, however the FTF Group’s Halo beam takes the concept to the next level with its “true” 360° diffusion pattern.

The substantially shorter air discharge throws (35%) offered by Halo can enable more chilled beams to be positioned into a given room space for higher total heat gains to be offset whilst still avoiding drafts and providing a comfortable environment, compliant to BS EN ISO 7730 / ASHRAE 55.

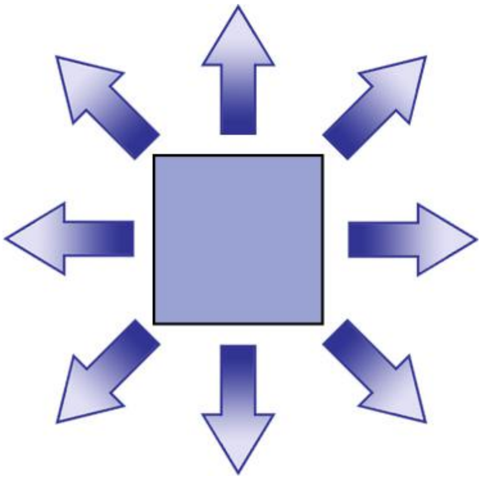
Fig 3. Halo™ Active Chilled Beam 4ft x 2ft Module fitted with architectural frame enhancement kit.



Traditional 2-way discharge beam



More recent 4-way discharge beam

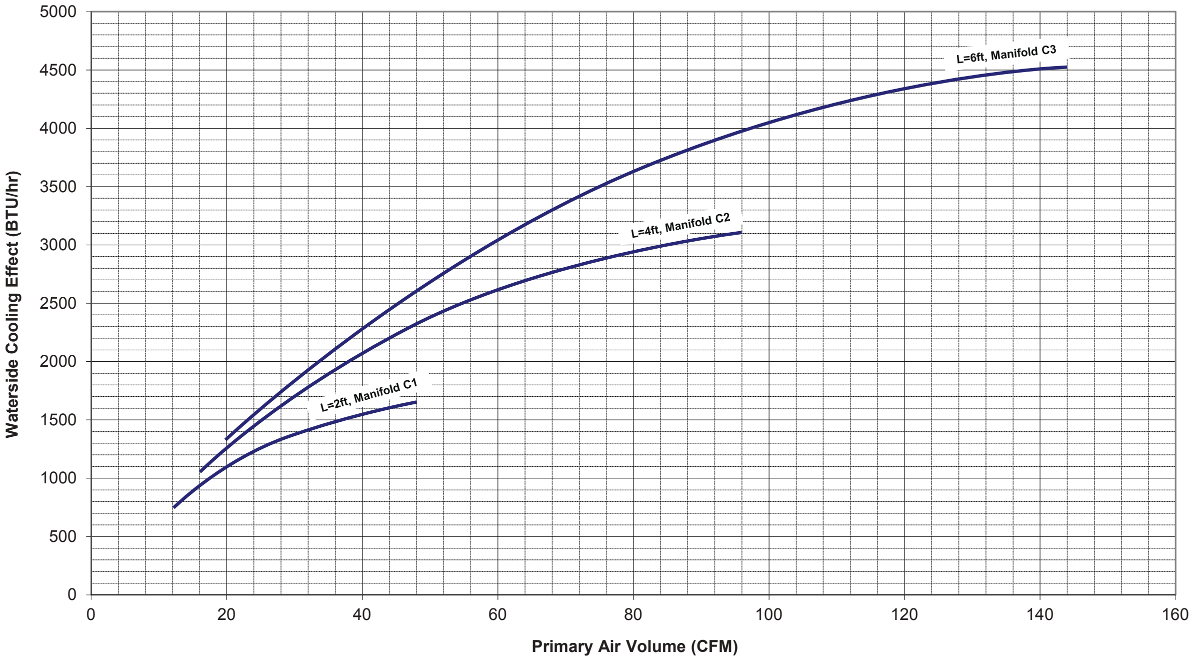


Halo™ “True 360°” discharge beam

Halo distributes air in a 360° pattern for shorter air throws and optimum comfort.

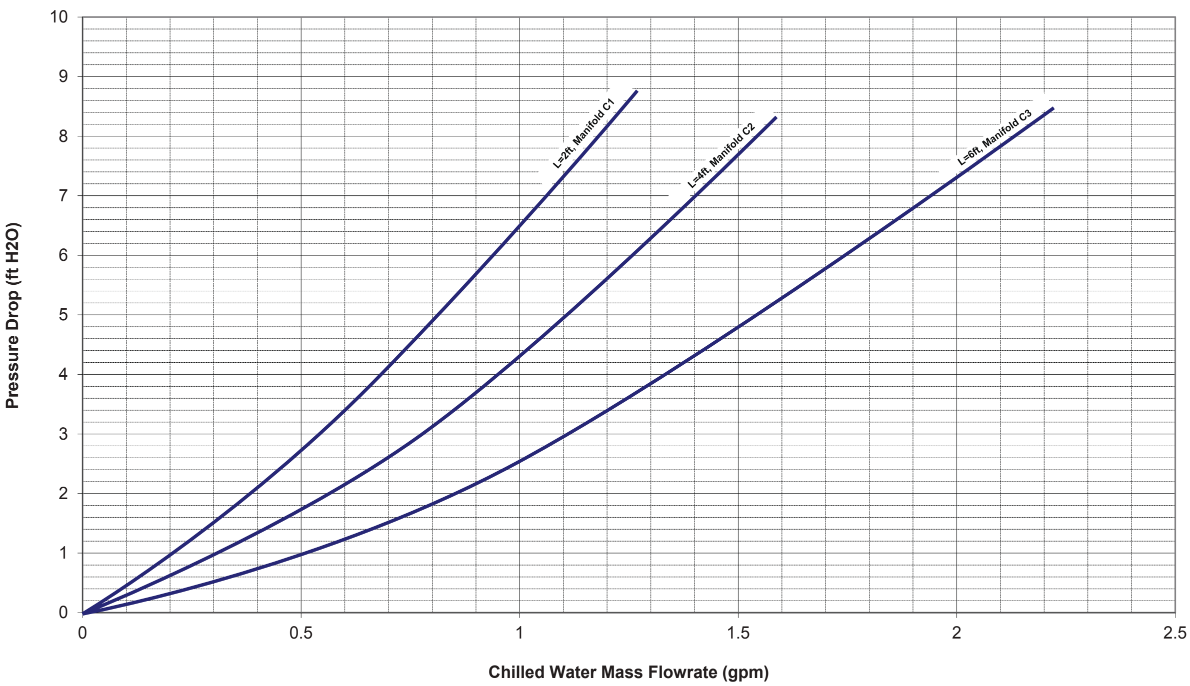
Cooling Performance

Halo Waterside Cooling Effect at 16.5 dTK
(Primary Air = 0.3"H2O, Chilled Water = 57/62°F, Room Condition = 76°F)

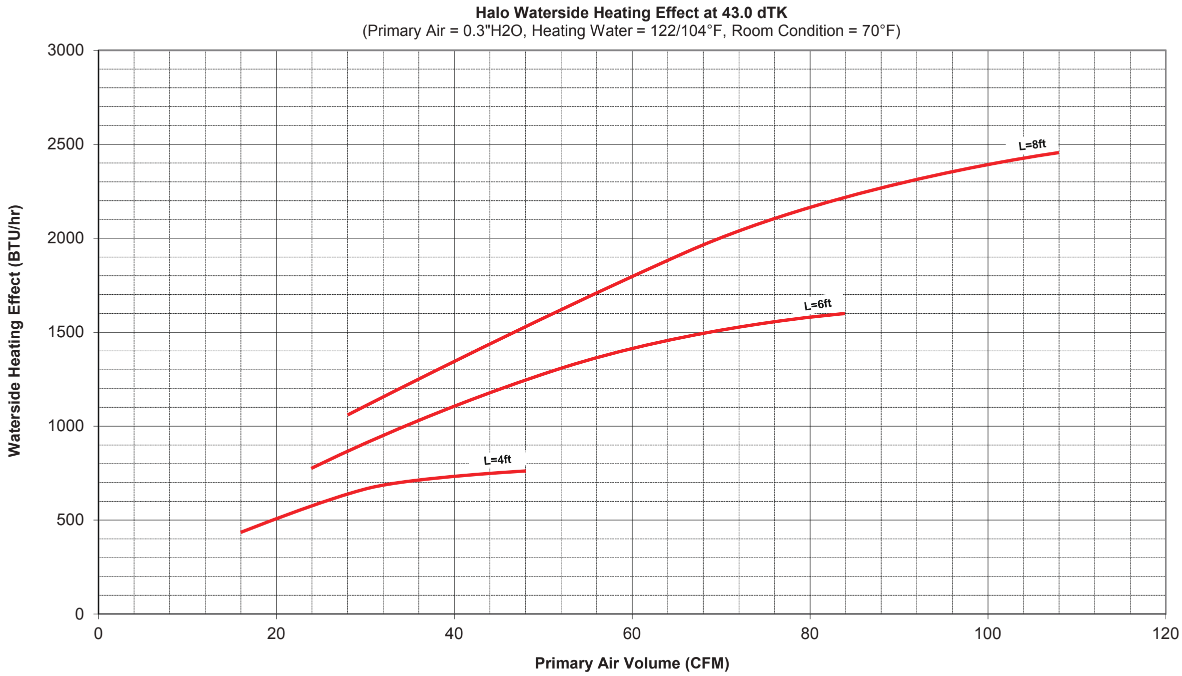


Pressure Drop

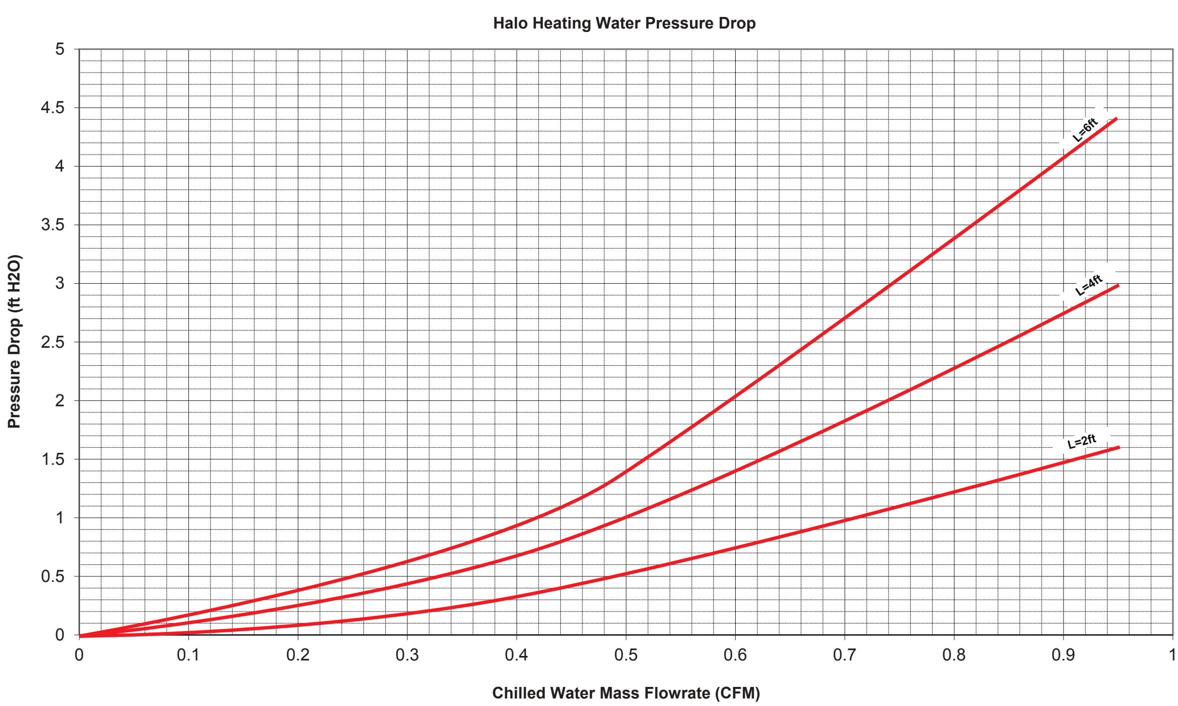
Halo Chilled Water Pressure Drop



Heating Performance



Pressure Drop



Cooling Selection Tables

Cooling at 0.24 Nozzle Pressure

Nozzle Pressure 0.24 H_2O		Water															
Q (CFM)	Halo	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_2O)	P (btu/h)	P (gpm)	Manifold	P (ft H_2O)	P (btu/h)	P (gpm)	Manifold	P (ft H_2O)	P (btu/h)	P (gpm)	Manifold	P (ft H_2O)
10	2.0	362	0.145	C1	0.6	466	0.186	C1	0.8	574	0.229	C1	1.0	684	0.273	C1	1.3
20	2.0	666	0.266	C1	1.2	831	0.332	C1	1.7	988	0.394	C1	2.1	1136	0.454	C1	2.6
	4.0	984	0.393	C1	5.8	1174	0.469	C1	7.6	1357	0.542	C1	9.6	1306	0.522	C2	1.7
	6.0	937	0.374	C2	1.8	1185	0.473	C2	2.4	1435	0.573	C2	3.1	1681	0.671	C2	3.8
30	2.0	866	0.346	C1	1.8	1064	0.425	C1	2.4	1247	0.498	C1	3.0	1424	0.569	C1	3.8
	4.0	1287	0.514	C1	8.8	1524	0.609	C1	11.5	1533	0.612	C2	2.0	1796	0.717	C2	2.5
	6.0	1308	0.522	C2	2.7	1621	0.647	C2	3.6	1922	0.767	C2	4.6	2208	0.882	C2	5.6
40	2.0	963	0.385	C1	2.1	1173	0.468	C1	2.8	1367	0.546	C1	3.5	1563	0.624	C1	4.3
	4.0	1494	0.597	C1	11.1	1526	0.609	C2	2.0	1829	0.731	C2	2.6	2117	0.846	C2	3.2
	6.0	1583	0.632	C2	3.5	1930	0.771	C2	4.6	2259	0.902	C2	5.8	2573	1.027	C2	7.2
50	4.0	1427	0.570	C2	1.9	1782	0.712	C2	2.5	2118	0.846	C2	3.2	2434	0.972	C2	4.0
	6.0	1886	0.753	C2	4.5	2265	0.905	C2	5.9	2625	1.048	C2	7.4	2989	1.194	C2	9.1
60	4.0	1592	0.636	C2	2.2	1979	0.790	C2	2.9	2338	0.934	C2	3.8	2677	1.069	C2	4.7
	6.0	2142	0.856	C2	5.4	2549	1.018	C2	7.1	2952	1.179	C2	8.9	3401	1.358	C2	11.0
70	4.0	1715	0.685	C2	2.4	2121	0.847	C2	3.2	2494	0.996	C2	4.2	2851	1.138	C2	5.2
	6.0	2356	0.941	C2	6.2	2795	1.116	C2	8.2	3260	1.302	C2	10.4	3485	1.392	C3	4.2

Flow-adjusted waterside cooling effect table. Cooling circuit Δt = 5°F (Water in-out), nozzle pressure of 0.24 inH_2O, 1 x Ø5” air connection.

Cooling at 0.32 Nozzle Pressure

Nozzle Pressure 0.32 H_2O		Water															
Q (CFM)	Halo	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_2O)	P (btu/h)	P (gpm)	Manifold	P (ft H_2O)	P (btu/h)	P (gpm)	Manifold	P (ft H_2O)	P (btu/h)	P (gpm)	Manifold	P (ft H_2O)
10	2.0	440	0.176	C1	0.8	562	0.224	C1	1.0	685	0.274	C1	1.3	807	0.322	C1	1.6
20	2.0	783	0.313	C1	1.5	962	0.384	C1	2.0	1130	0.451	C1	2.6	1289	0.515	C1	3.2
	4.0	1129	0.451	C1	7.1	1333	0.532	C1	9.3	1543	0.616	C1	11.7	1543	0.616	C2	2.1
	6.0	1147	0.458	C2	2.3	1432	0.572	C2	3.1	1711	0.683	C2	3.9	1978	0.790	C2	4.8
30	2.0	1039	0.415	C1	2.3	1246	0.497	C1	3.0	1445	0.577	C1	3.8	1659	0.663	C1	4.7
	4.0	1453	0.580	C1	10.7	1483	0.592	C2	2.0	1780	0.711	C2	2.5	2063	0.824	C2	3.1
	6.0	1545	0.617	C2	3.4	1885	0.753	C2	4.4	2207	0.881	C2	5.6	2512	1.003	C2	6.9
40	2.0	1184	0.473	C1	2.8	1404	0.561	C1	3.7	1635	0.653	C1	4.6	1922	0.767	C1	5.7
	4.0	1432	0.572	C2	1.9	1778	0.710	C2	2.5	2105	0.841	C2	3.2	2412	0.963	C2	4.0
	6.0	1835	0.733	C2	4.3	2207	0.881	C2	5.6	2557	1.021	C2	7.1	2905	1.160	C2	8.7
50	2.0	1285	0.513	C1	3.2	1519	0.607	C1	4.2	1788	0.714	C1	5.2	2160	0.863	C1	6.4
	4.0	1710	0.683	C2	2.4	2091	0.835	C2	3.2	2445	0.976	C2	4.0	2786	1.113	C2	5.0
	6.0	2159	0.862	C2	5.5	2564	1.024	C2	7.2	2966	1.184	C2	9.0	3416	1.364	C3	11.0
60	4.0	1943	0.776	C1	2.8	2347	0.937	C2	3.8	2726	1.089	C2	4.8	3113	1.243	C2	5.9
	6.0	2443	0.976	C2	6.6	2890	1.154	C2	8.7	3382	1.351	C2	10.9	3615	1.444	C3	4.4
70	4.0	2134	0.852	C2	3.3	2551	1.019	C2	4.3	2956	1.180	C2	5.5	3400	1.358	C2	6.7
	6.0	2695	1.076	C2	7.7	3204	1.280	C2	10.1	3496	1.396	C3	4.2	3988	1.593	C3	5.2

Flow-adjusted waterside cooling effect table. Cooling circuit Δt = 5°F (Water in-out), nozzle pressure of 0.32 inH_2O, 1 x Ø5” air connection.

Cooling at 0.4 Nozzle Pressure

Nozzle Pressure 0.4 H_2O		Water															
Q (CFM)	Halo	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_2O)	P (btu/h)	P (gpm)	Manifold	P (ft H_2O)	P (btu/h)	P (gpm)	Manifold	P (ft H_2O)	P (btu/h)	P (gpm)	Manifold	P (ft H_2O)
10	2.0	524	0.209	C1	0.9	664	0.265	C1	1.2	803	0.321	C1	1.6	936	0.374	C1	2.0
20	2.0	872	0.348	C1	1.8	1060	0.423	C1	2.4	1234	0.493	C1	3.0	1403	0.560	C1	3.7
	4.0	1277	0.510	C1	8.7	1508	0.602	C1	11.3	1525	0.609	C2	2.0	1787	0.714	C2	2.5
30	2.0	1124	0.449	C1	2.6	1337	0.534	C1	3.4	1552	0.620	C1	4.3	1806	0.721	C1	5.3
	4.0	1344	0.537	C2	1.7	1676	0.669	C2	2.3	1992	0.795	C2	2.9	2288	0.914	C2	3.6
	6.0	1785	0.713	C2	4.1	2152	0.859	C2	5.4	2495	0.997	C2	6.8	2832	1.131	C2	8.4
40	2.0	1263	0.505	C1	3.1	1497	0.598	C1	4.1	1764	0.705	C1	5.1	2141	0.855	C1	6.3
	4.0	1602	0.640	C2	2.2	1966	0.785	C2	2.9	2306	0.921	C2	3.7	2627	1.049	C2	4.5
	6.0	2067	0.825	C2	5.1	2460	0.982	C2	6.7	2840	1.134	C2	8.4	3249	1.297	C2	10.3
50	2.0	1365	0.545	C1	3.5	1625	0.649	C1	4.6	1959	0.782	C1	5.8	2512	1.003	C1	7.2
	4.0	1879	0.750	C2	2.7	2271	0.907	C2	3.6	2638	1.053	C2	4.6	3005	1.200	C2	5.6
	6.0	2379	0.950	C2	6.3	2811	1.122	C2	8.3	3273	1.307	C2	10.4	3520	1.406	C3	4.2
60	2.0	1389	0.555	C1	3.6	1657	0.662	C1	4.7	2015	0.805	C1	6.0	2639	1.054	C1	7.5
	4.0	2106	0.841	C2	3.2	2520	1.006	C2	4.2	2920	1.166	C2	5.4	3358	1.341	C2	6.6
	6.0	2655	1.060	C2	7.6	3149	1.258	C2	9.9	3448	1.377	C3	4.1	3930	1.570	C3	5.0
70	4.0	2289	0.914	C2	3.6	2721	1.087	C2	4.8	3162	1.263	C2	6.1	3693	1.475	C2	7.4
	6.0	2908	1.161	C2	8.7	3499	1.397	C2	11.4	4361	1.742	C3	4.7	4304	1.719	C3	5.8

Flow-adjusted waterside cooling effect table. Cooling circuit Δt = 5°F (Water in-out), nozzle pressure of 0.4 inH_2O, 1 x Ø5” air connection.

Heating Selection Tables

Heating at 0.24 Nozzle Pressure

Nozzle Pressure 0.24 H_2O		Water											
Q (CFM)	Halo	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)
10	2.0	348	0.190	0.1	425	0.190	0.1	502	0.190	0.1	579	0.190	0.1
20	2.0	504	0.190	0.1	615	0.190	0.1	725	0.190	0.1	835	0.190	0.1
	4.0	647	0.190	0.2	789	0.190	0.2	962	0.214	0.2	1170	0.260	0.3
	6.0	756	0.190	0.3	953	0.212	0.3	1200	0.267	0.5	1460	0.325	0.7
30	2.0	605	0.190	0.1	738	0.190	0.1	877	0.195	0.1	1066	0.237	0.1
	4.0	797	0.190	0.2	1024	0.228	0.2	1291	0.287	0.4	1570	0.350	0.5
	6.0	950	0.211	0.3	1261	0.281	0.5	1590	0.354	0.8	1934	0.430	1.1
40	2.0	650	0.190	0.1	792	0.190	0.1	968	0.215	0.1	1177	0.262	0.2
	4.0	912	0.203	0.2	1210	0.269	0.3	1526	0.340	0.5	1856	0.413	0.7
	6.0	1127	0.251	0.4	1497	0.333	0.7	1887	0.420	1.1	2292	0.510	1.5
50	4.0	1061	0.236	0.3	1409	0.314	0.4	1777	0.396	0.7	2160	0.481	0.9
	6.0	1334	0.297	0.6	1773	0.395	1.0	2232	0.497	1.4	2705	0.602	2.0
60	4.0	1179	0.262	0.3	1566	0.349	0.5	1974	0.439	0.8	2396	0.533	1.1
	6.0	1523	0.339	0.7	2022	0.450	1.2	2541	0.566	1.8	3072	0.684	2.5
70	4.0	1262	0.281	0.4	1677	0.373	0.6	2112	0.470	0.9	2562	0.570	1.2
	6.0	1690	0.376	0.9	2241	0.499	1.4	2811	0.626	2.1	3390	0.755	3.0

Flow-adjust waterside heating effect table. Heating circuit Δt = 9°F (Water in-out), nozzle pressure of 0.24 inH_2O, 1 x Ø5" 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)	Halo	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)
10	2.0	387	0.190	0.1	473	0.190	0.1	560	0.190	0.1	645	0.190	0.1
20	2.0	557	0.190	0.1	682	0.190	0.1	802	0.190	0.1	983	0.212	0.1
	4.0	715	0.190	0.2	881	0.196	0.2	1109	0.247	0.3	1350	0.300	0.4
	6.0	844	0.190	0.3	1114	0.248	0.4	1405	0.313	0.6	1709	0.380	0.9
30	2.0	680	0.190	0.1	827	0.190	0.1	1031	0.229	0.1	1253	0.279	0.2
	4.0	885	0.197	0.2	1173	0.261	0.3	1480	0.329	0.5	1800	0.401	0.7
	6.0	1094	0.244	0.4	1453	0.323	0.7	1833	0.408	1.0	2227	0.496	1.4
40	2.0	744	0.190	0.1	933	0.208	0.1	1175	0.262	0.2	1430	0.318	0.2
	4.0	1048	0.233	0.3	1392	0.310	0.4	1755	0.391	0.6	2133	0.475	0.9
	6.0	1293	0.288	0.6	1718	0.382	0.9	2163	0.481	1.4	2623	0.584	1.9
50	2.0	792	0.190	0.1	1017	0.226	0.1	1282	0.285	0.2	1560	0.347	0.3
	4.0	1233	0.274	0.3	1638	0.364	0.6	2064	0.459	0.9	2504	0.557	1.2
	6.0	1531	0.341	0.7	2032	0.452	1.2	2554	0.568	1.8	3087	0.687	2.5
60	4.0	1392	0.310	0.4	1849	0.411	0.7	2327	0.518	1.1	2818	0.627	1.5
	6.0	1754	0.390	0.9	2325	0.517	1.5	2914	0.649	2.3	3511	0.781	3.2
70	4.0	1522	0.339	0.5	2021	0.450	0.8	2540	0.565	1.2	3071	0.683	1.7
	6.0	1958	0.436	1.1	2591	0.577	1.9	3240	0.721	2.7	3892	0.866	3.8

Flow-adjust waterside heating effect table. Heating circuit Δt = 9°F (Water in-out), nozzle pressure of 0.32 inH_2O, 1 x Ø5" 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

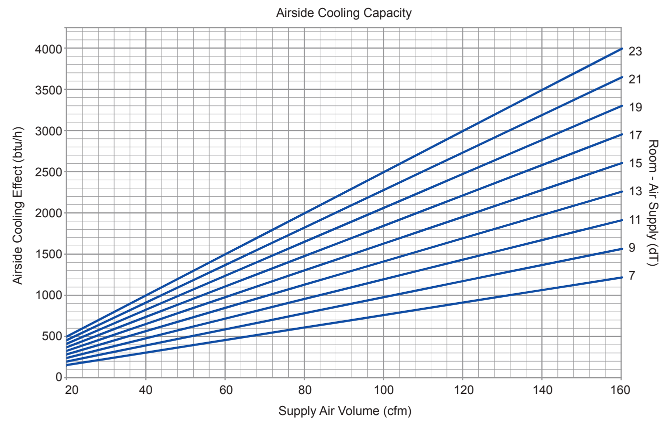
Nozzle Pressure 0.4 H_2O		Water											
Q (CFM)	Halo	ΔtK - 36°F			ΔtK - 45°F			ΔtK - 54°F			ΔtK - 63°F		
	L (ft)	P (btu/h)	P (gpm)	P (ft H_2O)	P (btu/h)	P (gpm)	P (ft H_2O)	P (btu/h)	P (gpm)	P (ft H_2O)	P (btu/h)	P (gpm)	P (ft H_2O)
10	2.0	431	0.190	0.1	527	0.190	0.1	623	0.190	0.1	717	0.190	0.1
20	2.0	598	0.190	0.1	728	0.190	0.1	863	0.192	0.1	1048	0.233	0.1
	4.0	789	0.190	0.2	1012	0.225	0.2	1276	0.284	0.4	1553	0.346	0.5
30	2.0	716	0.190	0.1	884	0.197	0.1	1113	0.248	0.2	1354	0.301	0.2
	4.0	987	0.220	0.2	1310	0.291	0.4	1652	0.368	0.6	2009	0.447	0.8
	6.0	1256	0.280	0.5	1669	0.371	0.9	2103	0.468	1.3	2551	0.568	1.8
40	2.0	782	0.190	0.1	1000	0.223	0.1	1261	0.281	0.2	1534	0.341	0.3
	4.0	1152	0.256	0.3	1531	0.341	0.5	1930	0.429	0.8	2343	0.522	1.1
	6.0	1458	0.324	0.7	1936	0.431	1.1	2435	0.542	1.7	2947	0.656	2.3
50	2.0	830	0.190	0.1	1088	0.242	0.1	1372	0.305	0.2	1670	0.372	0.3
	4.0	1340	0.298	0.4	1780	0.396	0.7	2241	0.499	1.0	2715	0.604	1.4
	6.0	1699	0.378	0.9	2253	0.501	1.5	2826	0.629	2.2	3408	0.758	3.0
60	2.0	841	0.190	0.1	1109	0.247	0.2	1398	0.311	0.2	1701	0.379	0.3
	4.0	1501	0.334	0.5	1993	0.444	0.8	2506	0.558	1.2	3030	0.674	1.7
	6.0	1924	0.428	1.1	2546	0.567	1.8	3185	0.709	2.7	3828	0.852	3.7
70	4.0	1634	0.364	0.6	2168	0.483	0.9	2722	0.606	1.4	3285	0.731	1.9
	6.0	2130	0.474	1.3	2813	0.626	2.1	3509	0.781	3.2	4206	0.936	4.3

Flow-adjust waterside heating effect table. Heating circuit Δt = 9°F (Water in-out), nozzle pressure of 0.4 inH_2O, 1 x Ø5" 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

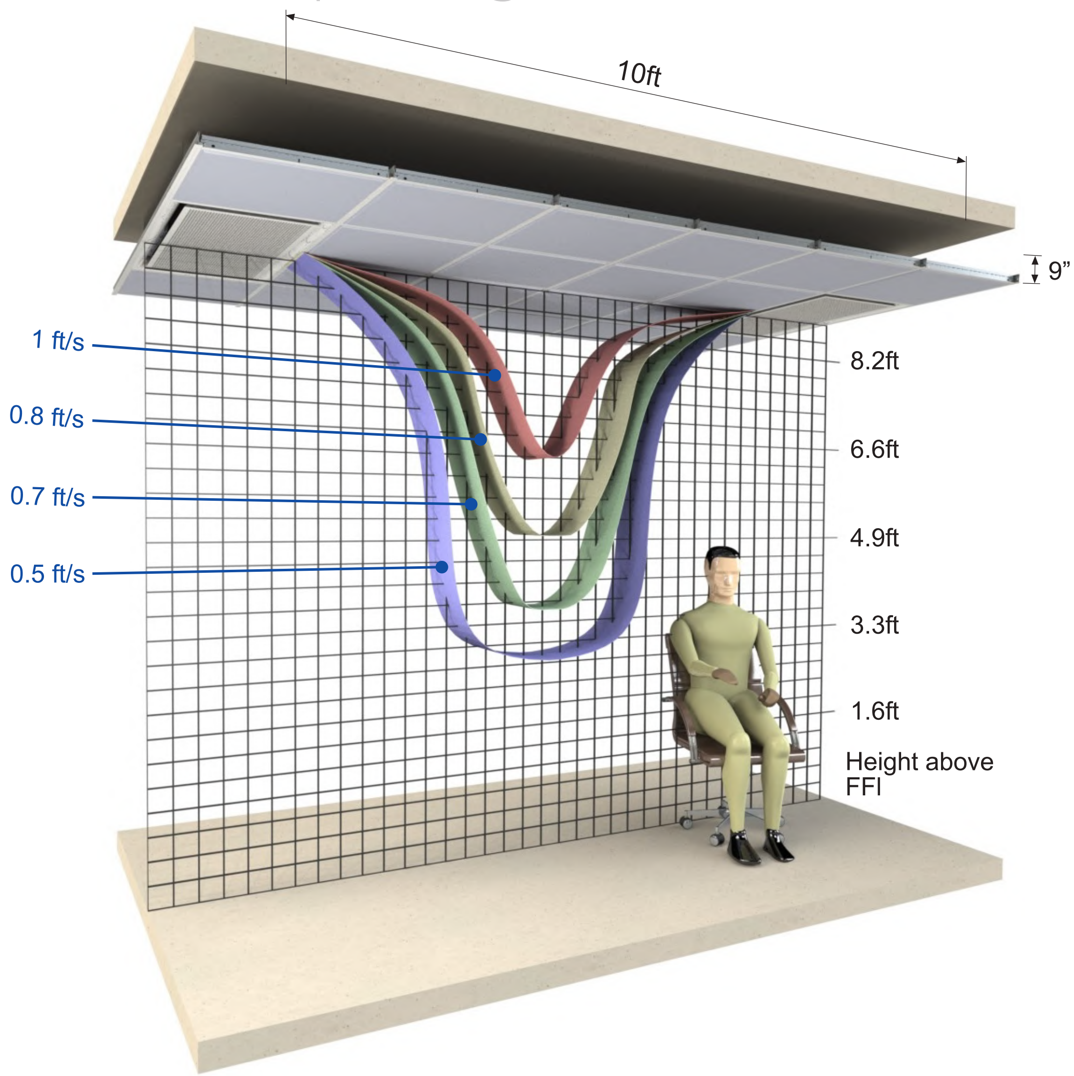
1. Start by calculating the required cooling effect that has to be supplied to the room in order to provide a certain temperature.
2. Calculate any cooling effect that is provided by the ventilation air.
3. The remaining cooling effect has to be supplied by the beam.



Air cooling effect as a function of airflow.

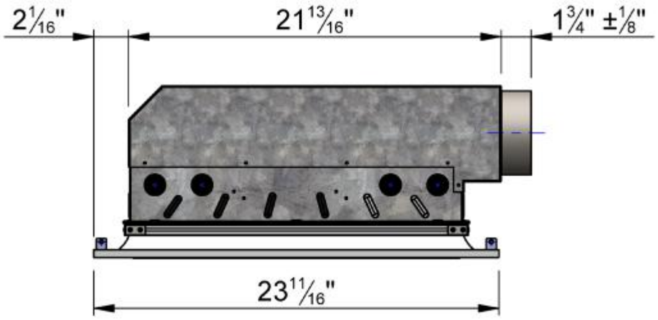
Scatter Diagram

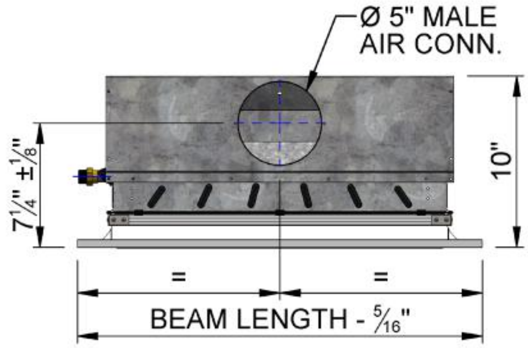
Fresh Air Volume 67.8 CFM per beam @ 0.32inH₂0



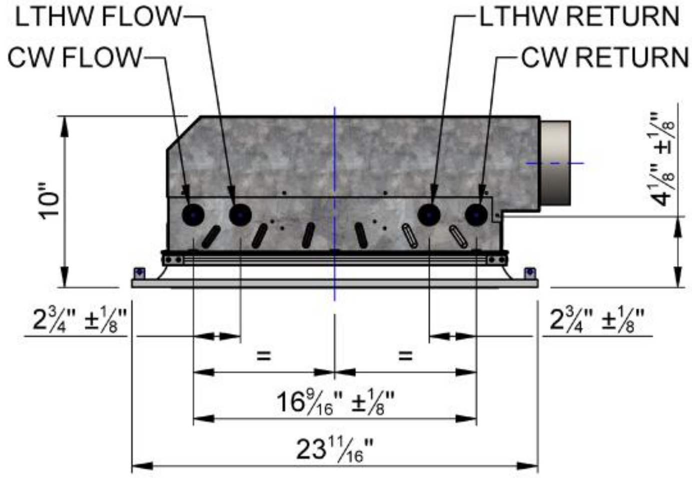
Product Dimensions

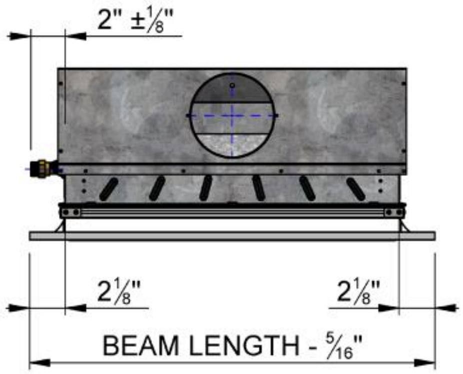
Air Connection



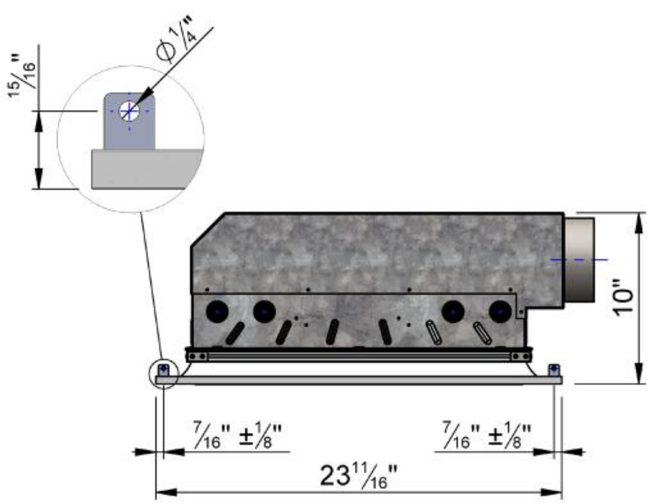


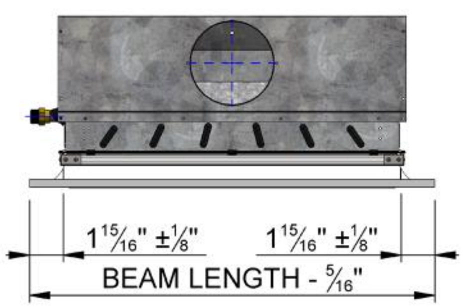
Water Connections



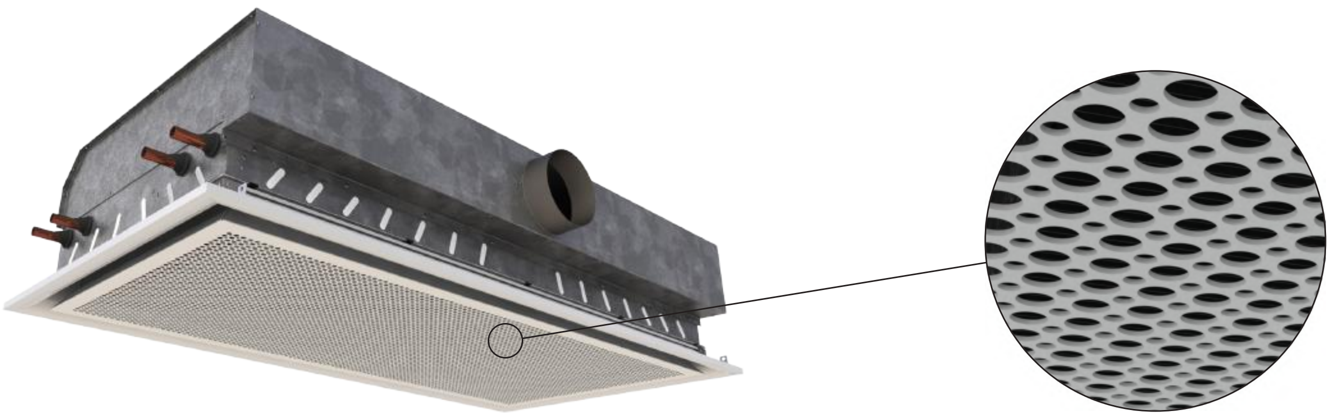


Mounting Details





Perforation Pattern Options



Note: Other aesthetic options are available on request.

Double Dot Perforation
51% Free Area

Product Ordering Codes

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

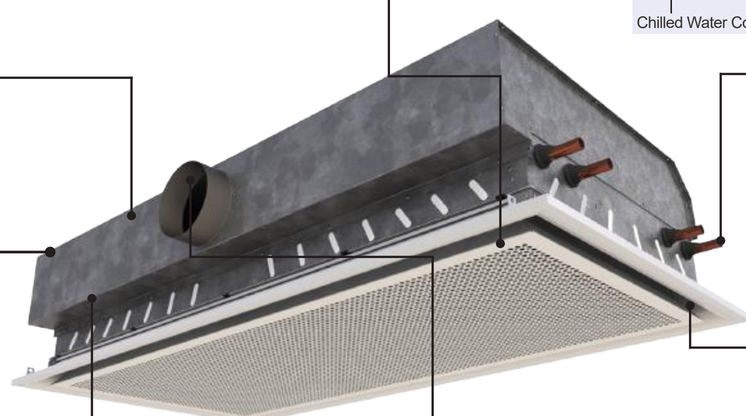
4. Underplate
- **7D -** 7Ø & 4Ø Double Dot / 51% Free Area
- **4D -** 4Ø Double Dot / 33% Free Area
- **5S -** 5x35 Slot / 43% Free Area

6. Waterside Connection

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

1/2 | C3 | H — Orientation - H: Horizontal

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



1. Beam Type
- **HAI -** Halo "Integrated"
- **HAC -** Halo "Clip in"
- **HAF -** Halo "Free Hanging"

3. Nominal Beam Length (ft)

5. Airside Connection

Air Connection Qty

1 x 15" H — Orientation - H: Horizontal

Air Connection Spigot Size (in) 5"

7. Air Supply / Discharge

Air Supply Volume (CFM)

21 | 04 | L

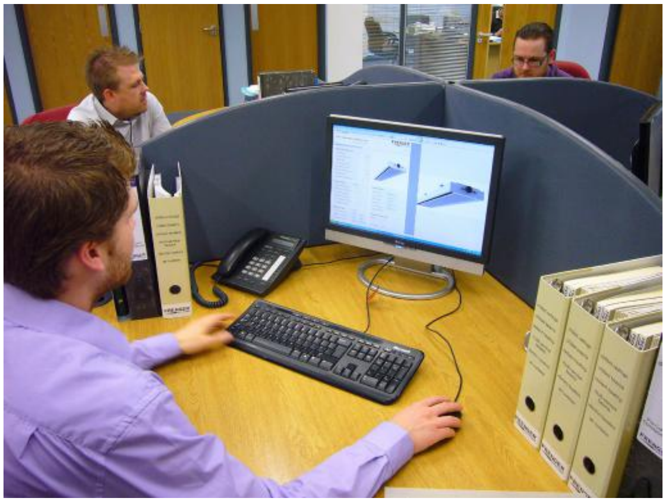
Air Discharge Characteristics
- L: Long Throw - No Discharge Vanes
- M: Medium Throw - 18° Discharge Vanes
- S: Short Throw - 35° Discharge Vanes

Air Supply Nozzle Pressure (inH_2O)

Example: HAI | CH | 2.0 | 7D - 1 x 5"H | 1/2C3H - 2104L

HAI	CH	2.0	7D	1 x 5"H	1/2C3H	2104L
1	2	3	4	5	6	7

Calculation Program



Active Chilled Beam Calculation Tool

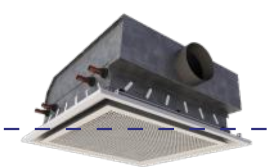
FTF GROUP® Climate

Is this the latest version?

version v1.1

Project Ref.

Halo Active Beam Data		
Halo Type	Standard	
Air Connection Orientation	Horizontal	
Air Connection	1x5"	
Product Length	6'	
Manifold Type	C2	
Air Discharge Throw	L	
Nozzle Static Pressure	0.4	" H2O
Fresh Air Supply Volume	70	CFM
Underplate Perforation Type	51% DOT	
Heating Function	Yes	
Ceiling System	Lay In Grid	



Design Conditions	Cooling		Heating	
Flow Water Temperature	57.0	°F	122.0	°F
Return Water Temperature	63.0	°F	113.0	°F
Air Supply Temperature	61.0	°F	60.0	°F
Average Room Condition	75.0	°F	69.0	°F
"Air On" Thermal Gradient	1.2	°F		
Room Relative Humidity	50.0	%		

Dimensional Data		
Width x Depth	2ft x 10"	mm
Overall Length	6"	ft
Water Volume	1.0	gal
Dry Weight	105.4	lb
CW Connection	1/2"NPT	
LTHW Connection	1/2"NPT	

Performance Data	Cooling		Heating	
Air On - Mean Water dT	16.20	°F	48.5	°F
Waterside Performance	3493	BTU/Hr	3083	BTU/Hr
Water Mass Flowrate	1.162	gpm	0.686	gpm
Waterside Pressure Drop	8.8	ft H2O	2.5	ft H2O
Airside Performance	1083	BTU/Hr	-696	BTU/Hr
Total Sensible Performance	**4576**	**BTU/Hr**	**2387**	**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 Vol @ 40 Pa	45.6	CFM
Calculated Dew Point	55.1	°F

Model Ref: HA-CH-6'7D-1x5"H1/2" NPTC2H-34100L

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 10 foot centres for alternative layouts contact FTF Technical Dept for throw settings

Halo Active Beam Data		
Halo Type	Standard	
Air Connection Orientation	Horizontal	
Air Connection	1x5"	
Product Length	6'	ft
Manifold Type	C2	
Air Discharge Throw	L	
Nozzle Static Pressure	0.4	" H2O
Fresh Air Volume	70	CFM
Underplate Perforation Type	51% DOT	
Heating Function	Yes	
Ceiling System	Lay In Grid	

The FTF Group's calculation program for Halo 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, chose 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 Perorated" options can be found on page 11.

Design Conditions	Cooling		Heating	
Flow Water Temperature	57.0	°F	122.0	°F
Return Water Temperature	63.0	°F	113.0	°F
Air Supply Temperature	61.0	°F	60.0	°F
Average Room Condition	75.0	°F	69.0	°F
"Air On" Thermal Gradient	1.2	°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	
Air On - Mean Water dT	16.20	°F	48.50	°F
Waterside Performance	3493	BTU/Hr	3083	BTU/Hr
Waterside Mass Flowrate	1.162	gpm	0.686	gpm
Waterside Pressure Drop	8.8	ft H2O	2.4	ft H2O
Airside Performance	1083	BTU/Hr	-696	BTU/Hr
Total Sensible Performance	**4756**	**BTU/Hr**	**2387**	**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 Halo 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

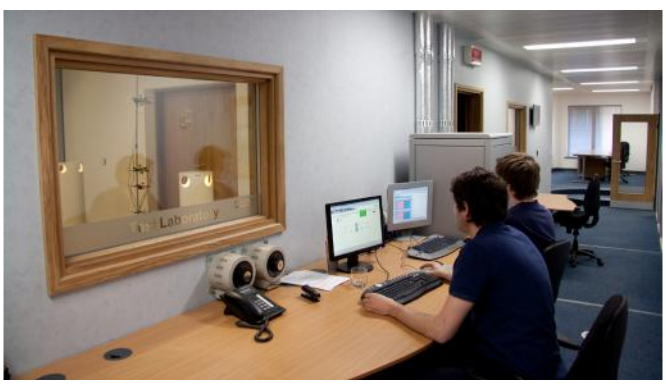
The FTF Group have 3 number state-of-the-art Climatic Testing Laboratories at one if its subsidiary companies predominantly situated at the prestigious Pride Park. Each laboratory has internal dimensions of 20.7ft x 18.7ft x 10.8ft high and includes a thermal wall so that both core and perimeter zones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

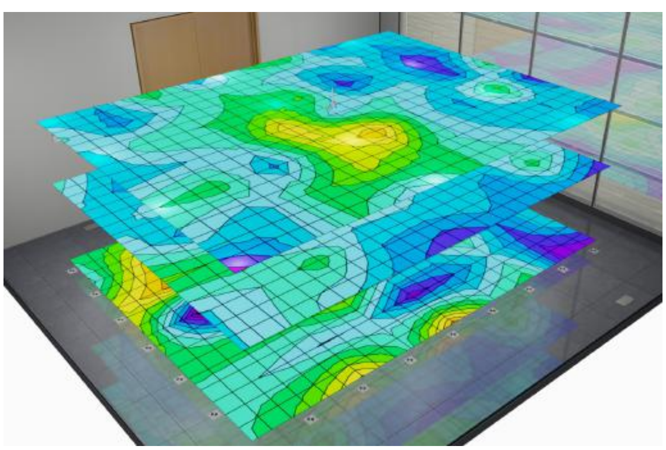
Project Specific Testing

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

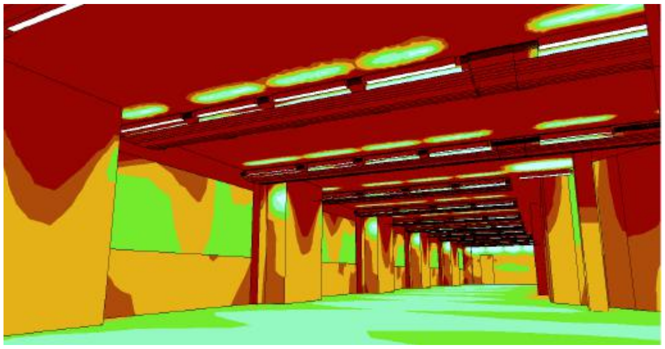
The FTF Group's technical facility at Pride Park, Derby also has two Photometric test laboratories which are used to evaluate the performance of luminaires. To measure the performance, it is necessary to obtain values of light intensity distribution from the luminaire. These light intensity distributions 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.

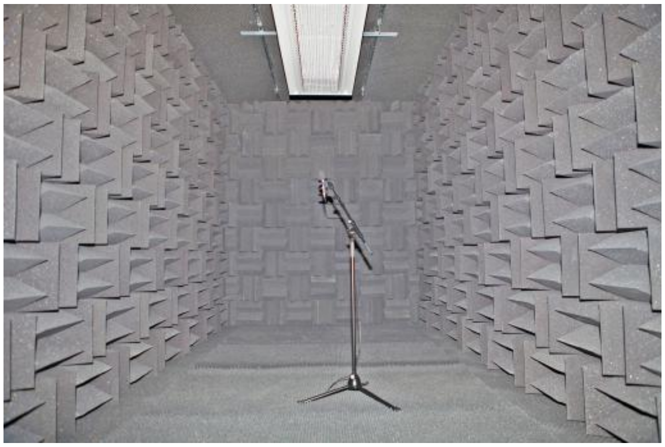
All tests use appropriate equipment to measure and control the characteristics of the luminaire and include air temperature measurements, luminaire supply voltage, luminaire current and power. Thermal characteristics of luminaire components can be recorded during the testing process as required.



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



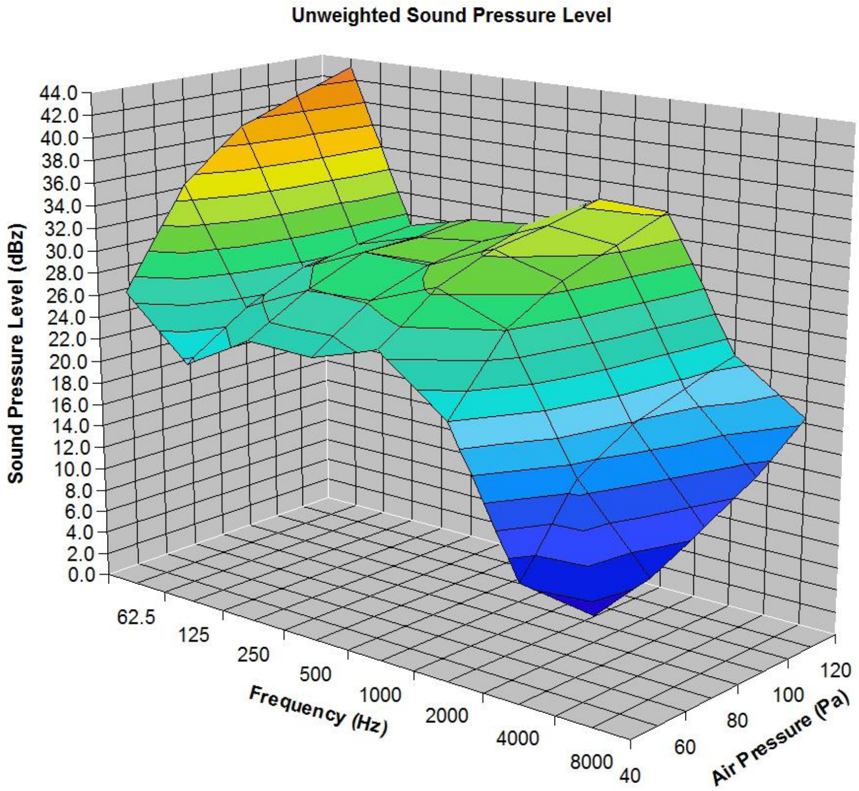
The Acoustic Test Room at the FTF Groups Technical Facility is a hemi-anechoic chamber which utilises sound absorbing acoustic foam material in the shape of wedges to provide an echo free zone for acoustic measurement; the height of the acoustic foam wedges has a direct relationship with the maximum 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.



FTF GROUP®
Climate

American Office

FTF Group Climate
Bryant Park
104 W40th Street
Suite 400 & 500
New York
NY 10018
United States of America

tel: +00 1 (646) 571-2151
sales@ftfgroup.us
www.ftfgroup.us

UK Head Office

Frenger System Ltd
Riverside Road
Pride Park
Derby
DE24 8HY

tel: +44 0 1332 295 678
sales@frenger.co.uk
www.frenger.co.uk

Australian Office

Frenger
Level 20
Tower 2
201 Sussex Street
Sydney
NSW 2000
Australia

tel: +61 2 9006 1147
sales@frenger.com.au
www.frenger.com.au

Frenger Systems is a wholly owned subsidiary of the **FTF Group Ltd.**
Registered No. 646 6229 20

www.FTFgroup.us