the future of space conditioning

Cornice™

active chilled beam

www.FTFgroup.us

FTF GROUP®
Climate

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

Contents

Product Description

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 1ft 1⅜" deep and can achieve **599.8 BTU/hr/ft total cooling** (based on 18dTF and 10.3 CFM/ft for a beam supplied at 60.8°F with a 0.4inH_2O).

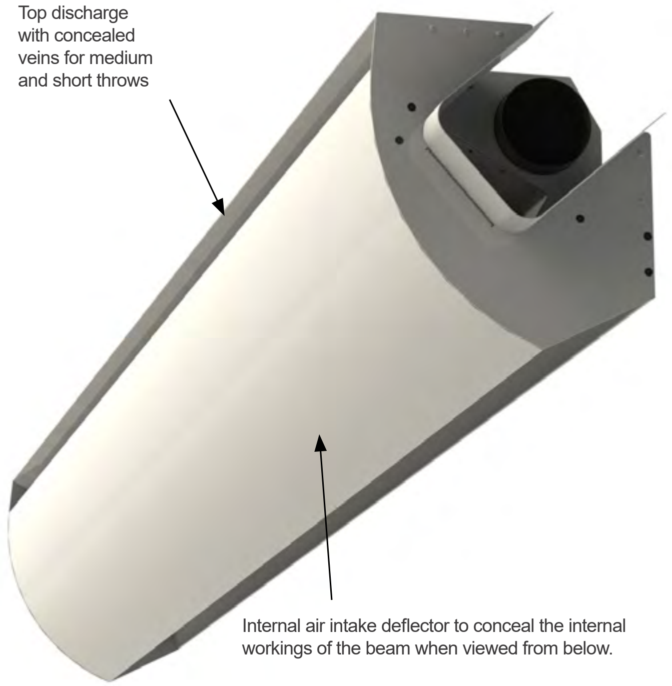
The Cornice beam contains a number of **Patented performance enhancing features** and as can be expected from the FTF Group brand, the Cornice beam is designed to be easily tailored to suit the unique parameters of individual project sites, for the optimum product / system efficiencies. This is partly 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 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 front fascias true and straight for long lengths, even up to 11ft 8".

Cornice can be used in most types of commercial building (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 with optimal features such as:

- LED lighting - see page 14.
- Condensation tray - see page 14.
- Electric Radiant Heating - see page 12.

All induced / recirculated room air is via the FTF Group's 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 Patented 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.

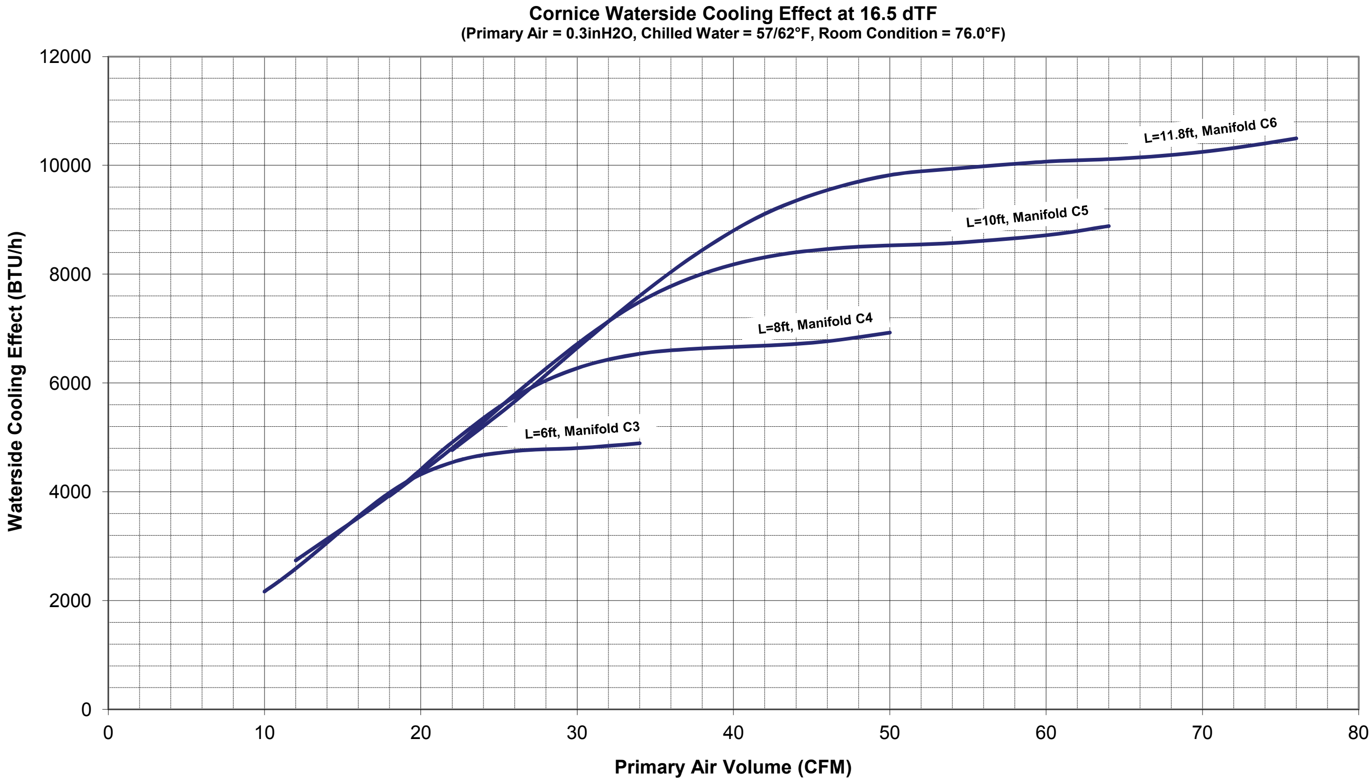
Cornice can have a variety of different front fascias for different aesthetics. The front fascia is easily removable for cleaning purposes and / or access to the control valves which are neatly concealed behind the removable main front fascia.

Cornice is available in any length from 4ft up to 11ft 8" in 4" 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

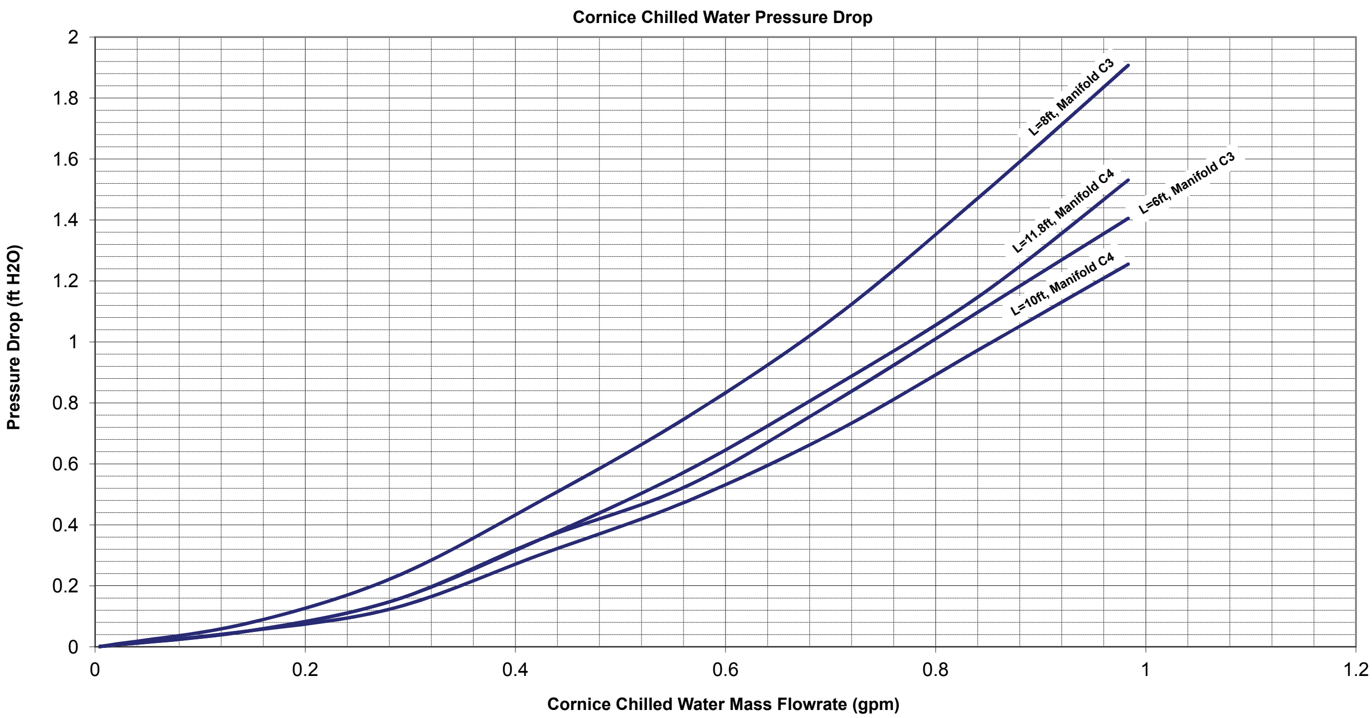
- Telescopic ends for full "Wall to Wall" installation.
- Controls are (factory fitted or site fitted) concealed behind easily removable front fascia panel.
- LED Lighting can be incorporated within the Cornice unit as an optional extra.
- Different front fascia designs (perforations) are available for Cornice.
- L.T.H.W heating function (4 pipe) is available.
- Electric Radiant Heating to the main front fascia available.
- Acoustic options for sound reducing 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

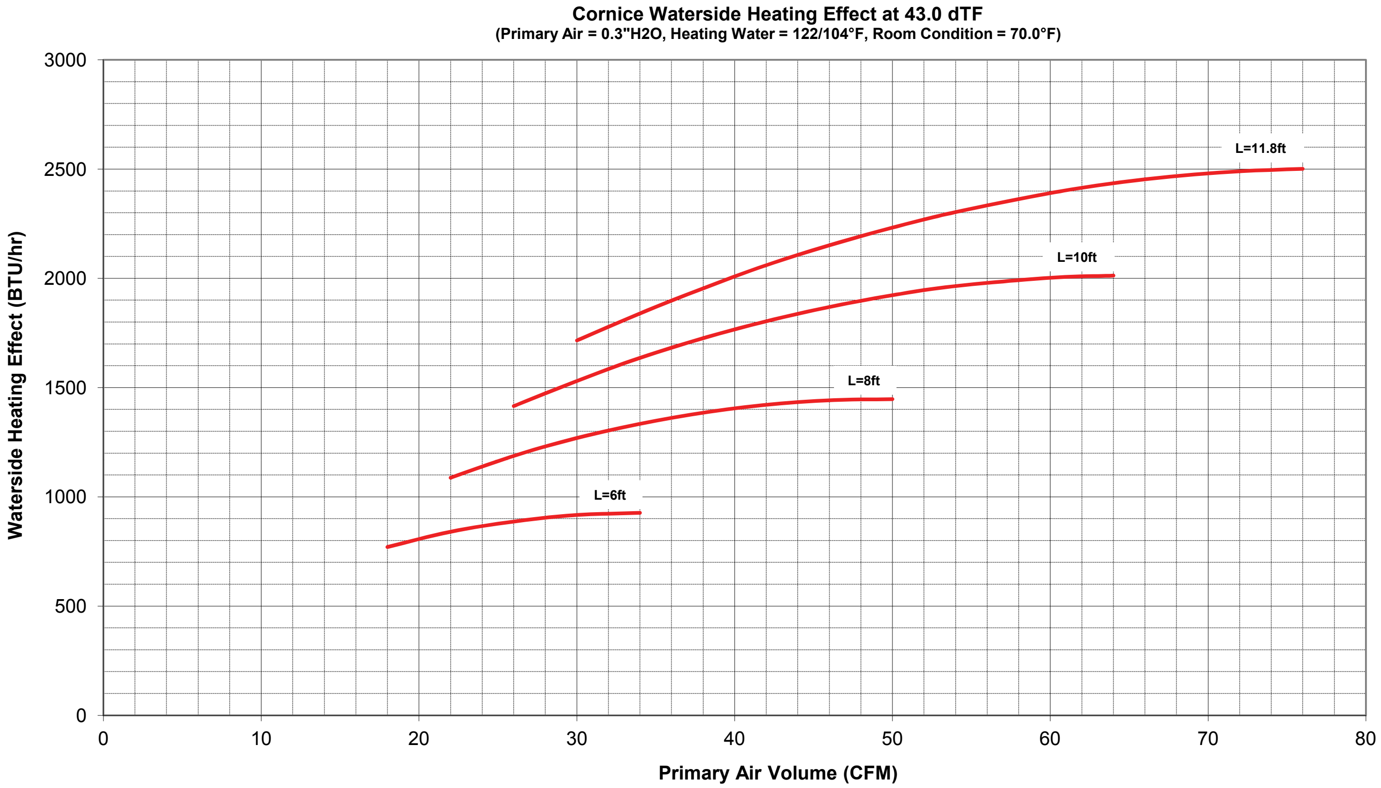


Cooling figures are based on a cooling & heating beams, additional cooling is possible with a cooling only product - contact the FTF Group for more information.

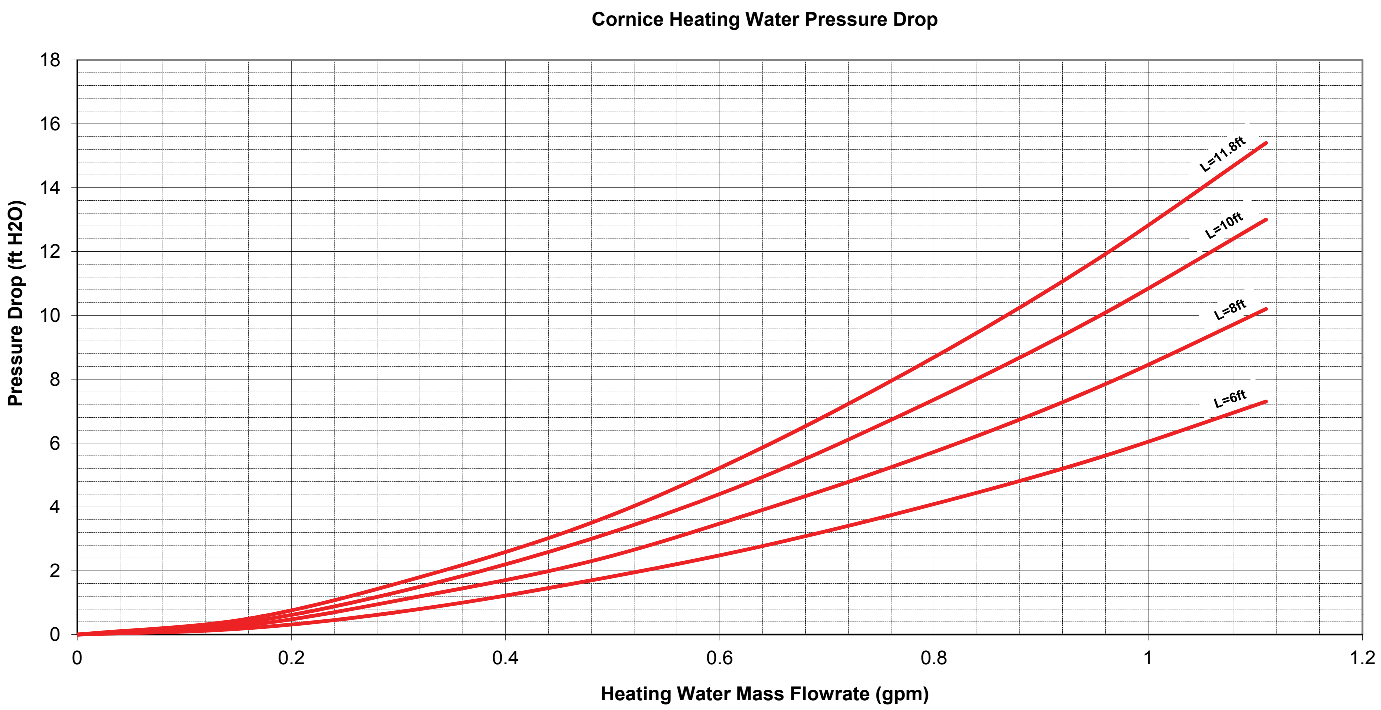
Pressure Drop



Heating Performance



Pressure Drop



Cooling Selection Tables

Cooling at 0.24 Nozzle Pressure

Nozzle Pressure 0.24 inH$_2$O		Water															
Q (CFM)	Cornice	ΔtK - 12.5°F				ΔtK - 14.5°F				ΔtK - 16.5°F				ΔtK - 18.5°F			
	L (ft)	p(BTU/hr)	p(gpm)	Manifold	p(ft H$_2$O)	p(BTU/hr)	p(gpm)	Manifold	p(ft H$_2$O)	p(BTU/hr)	p(gpm)	Manifold	p(ft H$_2$O)	p(BTU/hr)	p(gpm)	Manifold	p(ft H$_2$O)
10	6.0	1876	0.749	C3	1.0	1972	0.788	C3	1.1	2068	0.826	C3	1.1	2164	0.864	C3	1.2
	8.0	2108	0.842	C3	1.6	2213	0.884	C3	1.8	2318	0.926	C3	1.9	2424	0.968	C3	2.1
	10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	6.0	3772	1.506	C3	3.2	3959	1.581	C3	3.5	4145	1.655	C3	3.8	4331	1.730	C3	4.1
	8.0	4123	1.647	C3	5.3	4322	1.726	C3	5.7	4520	1.805	C3	6.2	4719	1.884	C3	6.7
	10.0	4088	1.632	C3	6.6	4282	1.710	C3	7.2	4476	1.787	C3	7.8	4558	1.820	C4	4.0
	11.8	4102	1.638	C3	7.9	4188	1.672	C4	4.1	4384	1.751	C4	4.5	4580	1.829	C4	4.8
30	6.0	4017	1.604	C3	3.6	4214	1.683	C3	3.9	4411	1.762	C3	4.2	4609	1.840	C3	4.6
	8.0	5430	2.169	C4	4.3	5696	2.275	C4	4.6	5963	2.381	C4	5.0	6229	2.488	C4	5.4
	10.0	6127	2.447	C4	6.8	6423	2.565	C4	7.3	6721	2.685	C4	7.9	6871	2.744	C5	4.5
	11.8	6119	2.444	C5	4.3	6418	2.563	C5	4.7	6716	2.682	C5	5.1	7014	2.801	C5	5.5
42	6.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.0	5594	2.234	C4	4.5	5868	2.343	C4	4.9	6141	2.452	C4	5.3	6415	2.562	C4	5.7
	10.0	7116	2.842	C5	4.7	7463	2.981	C5	5.1	7811	3.119	C5	5.6	8161	3.259	C5	6.0
	11.8	8109	3.238	C5	7.0	8505	3.397	C5	7.6	8735	3.488	C6	4.4	9126	3.645	C6	4.7

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.
Please refer to FTF Group Technical Department for selections not covered within these tables.

Cooling at 0.32 Nozzle Pressure

Nozzle Pressure 0.32 inH$_2$O		Water															
Q (CFM)	Cornice	ΔtK - 12.5°F				ΔtK - 14.5°F				ΔtK - 16.5°F				ΔtK - 18.5°F			
	L (ft)	p(BTU/hr)	p(gpm)	Manifold	p(ft H$_2$O)	p(BTU/hr)	p(gpm)	Manifold	p(ft H$_2$O)	p(BTU/hr)	p(gpm)	Manifold	p(ft H$_2$O)	p(BTU/hr)	p(gpm)	Manifold	p(ft H$_2$O)
10	6.0	1993	0.796	C3	1.1	2094	0.836	C3	1.2	2197	0.877	C3	1.3	2299	0.918	C3	1.4
	8.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	6.0	3990	1.593	C3	3.5	4188	1.672	C3	3.9	4385	1.751	C3	4.2	4582	1.830	C3	4.5
	8.0	4175	1.667	C3	5.4	4373	1.747	C3	5.8	4572	1.826	C3	6.3	4770	1.905	C3	6.8
	10.0	4192	1.674	C3	7.0	4387	1.752	C3	7.5	4489	1.793	C4	3.9	4688	1.872	C4	4.3
	11.8	4289	1.713	C4	4.3	4496	1.795	C4	4.7	4701	1.878	C4	5.1	4906	1.959	C4	5.5
30	6.0	4497	1.796	C3	4.4	4717	1.884	C3	4.8	4937	1.972	C3	5.1	5159	2.060	C3	5.6
	8.0	5814	2.322	C4	4.8	6099	2.435	C4	5.2	6384	2.549	C4	5.6	6671	2.664	C4	6.1
	10.0	6301	2.516	C4	7.1	6604	2.637	C4	7.7	6766	2.702	C5	4.3	7069	2.823	C5	4.7
	11.8	6198	2.475	C5	4.4	6499	2.595	C5	4.8	6798	2.715	C5	5.2	7097	2.834	C5	5.6
42	6.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.0	6265	2.502	C4	5.5	6571	2.624	C4	5.9	6878	2.747	C4	6.4	7190	2.871	C4	6.9
	10.0	7729	3.087	C5	5.5	8106	3.237	C5	5.9	8486	3.389	C5	6.4	8871	3.543	C5	6.9
	11.8	8588	3.429	C5	7.7	8831	3.527	C6	4.4	9245	3.692	C6	4.8	9660	3.858	C6	5.2

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.
Please refer to FTF Group Technical Department for selections not covered within these tables.

Cooling at 0.40 Nozzle Pressure

Nozzle Pressure 0.40 inH_2O		Water															
Q (CFM)	Cornice	ΔtK - 12.5°F				ΔtK - 14.5°F				ΔtK - 16.5°F				ΔtK - 18.5°F			
	L (ft)	p(BTU/hr)	p(gpm)	Manifold	p(ft H_2O)	p(BTU/hr)	p(gpm)	Manifold	p(ft H_2O)	p(BTU/hr)	p(gpm)	Manifold	p(ft H_2O)	p(BTU/hr)	p(gpm)	Manifold	p(ft H_2O)
10	6.0	2161	0.863	C3	1.2	2270	0.907	C3	1.3	2379	0.950	C3	1.5	2489	0.994	C3	1.6
	8.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	6.0	4216	1.684	C3	3.9	4421	1.765	C3	4.3	4625	1.847	C3	4.6	4830	1.929	C3	5.0
	8.0	4370	1.745	C3	5.8	4575	1.827	C3	6.3	4781	1.909	C3	6.8	4987	1.991	C3	7.4
	10.0	4442	1.774	C3	7.7	4563	1.822	C4	4.1	4772	1.906	C4	4.4	4981	1.989	C4	4.7
	11.8	4638	1.852	C4	4.9	4858	1.940	C4	5.4	5076	2.027	C4	5.8	5293	2.114	C4	6.2
30	6.0	4900	1.957	C3	5.1	5140	2.053	C3	5.5	5383	2.150	C3	6.0	5630	2.248	C3	6.5
	8.0	6182	2.469	C4	5.4	6481	2.588	C4	5.8	6782	2.708	C4	6.3	7087	2.830	C4	6.8
	10.0	6590	2.632	C4	7.7	6781	2.708	C5	4.4	7092	2.832	C5	4.7	7403	2.957	C5	5.1
	11.8	6503	2.597	C5	4.8	6812	2.721	C5	5.2	7121	2.844	C5	5.7	7428	2.966	C5	6.1
42	6.0	5247	2.095	C3	5.7	5508	2.200	C3	6.2	5775	2.306	C3	6.7	5830	2.328	C4	3.5
	8.0	6827	2.727	C4	6.3	7164	2.861	C4	6.9	7507	2.998	C4	7.5	7859	3.138	C4	8.0
	10.0	8291	3.311	C5	6.2	8696	3.473	C5	6.7	9107	3.637	C5	7.3	9527	3.805	C5	7.8
	11.8	8886	3.549	C6	4.5	9315	3.720	C6	4.9	9745	3.892	C6	5.3	10179	4.065	C6	5.7

Flow-adjusted waterside cooling effect table. Cooling circuit Δt = 5°F (Water in-out), nozzle pressure of 0.40 inH_2O, 1 x Ø4” air connection.
Please refer to FTF Group Technical Department for selections not covered within these tables.

Cooling at 0.48 Nozzle Pressure

Nozzle Pressure 0.48 inH_2O		Water															
Q (CFM)	Cornice	ΔtK - 12.5°F				ΔtK - 14.5°F				ΔtK - 16.5°F				ΔtK - 18.5°F			
	L (ft)	p(BTU/hr)	p(gpm)	Manifold	p(ft H_2O)	p(BTU/hr)	p(gpm)	Manifold	p(ft H_2O)	p(BTU/hr)	p(gpm)	Manifold	p(ft H_2O)	p(BTU/hr)	p(gpm)	Manifold	p(ft H_2O)
10	6.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	6.0	4183	1.670	C3	3.9	4382	1.750	C3	4.2	4582	1.830	C3	4.6	4782	1.910	C3	4.9
	8.0	4491	1.793	C3	6.1	4700	1.877	C3	6.7	4909	1.960	C3	7.2	5119	2.044	C3	7.7
	10.0	4479	1.789	C3	7.8	4611	1.841	C4	4.1	4820	1.925	C4	4.5	5029	2.008	C4	4.8
	11.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	6.0	5058	2.020	C3	5.4	5307	2.119	C3	5.8	5560	2.220	C3	6.3	5819	2.324	C3	6.8
	8.0	6112	2.445	C4	5.3	6415	2.562	C4	5.7	6709	2.679	C4	6.2	7007	2.798	C4	6.7
	10.0	6643	2.653	C4	7.8	6854	2.737	C5	4.5	7163	2.861	C5	4.8	7473	2.984	C5	5.2
	11.8	6697	2.674	C5	5.1	7011	2.800	C5	5.5	7324	2.925	C5	6.0	7637	3.050	C5	6.4
42	6.0	5501	2.197	C3	6.2	5782	2.309	C3	6.7	5832	2.329	C4	3.4	6099	2.436	C4	3.7
	8.0	7062	2.820	C4	6.7	7414	2.961	C4	7.3	7774	3.104	C4	7.9	7907	3.158	C5	4.5
	10.0	8246	3.293	C5	6.2	8647	3.453	C5	6.7	9053	3.615	C5	7.2	9466	3.780	C5	7.8
	11.8	8807	3.517	C6	4.5	9226	3.684	C6	4.8	9646	3.852	C6	5.2	10068	4.021	C6	5.6

Flow-adjusted waterside cooling effect table. Cooling circuit Δt = 5°F (Water in-out), nozzle pressure of 0.48 inH_2O, 1 x Ø4” air connection.
Please refer to FTF Group Technical Department for selections not covered within these tables.

Heating Selection Tables

Heating at 0.24 Nozzle Pressure

Nozzle Pressure 0.24 H_2O		Water											
Q (CFM)	Cornice	ΔtK - 36°F			ΔtK - 45°F			ΔtK - 54°F			ΔtK - 63°F		
	L (ft)	p(BTU/hr)	p(gpm)	p(ft H_2O)	p(BTU/hr)	p(gpm)	p(ft H_2O)	p(BTU/hr)	p(gpm)	p(ft H_2O)	p(BTU/hr)	p(gpm)	p(ft H_2O)
10	6.0	591	0.190	0.3	720	0.190	0.3	850	0.190	0.3	989	0.198	0.4
	8.0	695	0.190	0.5	847	0.190	0.5	1016	0.204	0.5	1216	0.244	0.7
	10.0	-	-	-	-	-	-	-	-	-	-	-	-
	11.8	-	-	-	-	-	-	-	-	-	-	-	-
20	6.0	781	0.190	0.3	955	0.191	0.3	1197	0.240	0.5	1444	0.289	0.7
	8.0	923	0.190	0.5	1199	0.240	0.7	1489	0.298	1.1	1781	0.357	1.4
	10.0	1074	0.215	0.8	1398	0.280	1.2	1725	0.346	1.7	2051	0.411	2.4
	11.8	1192	0.239	1.1	1545	0.310	1.7	1899	0.380	2.4	2250	0.451	3.3
30	6.0	860	0.190	0.3	1097	0.220	0.4	1382	0.277	0.7	1670	0.334	0.9
	8.0	1126	0.226	0.6	1479	0.296	1.0	1835	0.368	1.5	2189	0.439	2.1
	10.0	1345	0.269	1.1	1750	0.351	1.8	2153	0.431	2.6	2552	0.511	3.4
	11.8	1496	0.300	1.6	1935	0.388	2.5	2370	0.475	3.6	2798	0.561	4.8
42	6.0	-	-	-	-	-	-	-	-	-	-	-	-
	8.0	1254	0.251	0.8	1653	0.331	1.3	2051	0.411	1.8	2444	0.490	2.5
	10.0	1579	0.316	1.5	2051	0.411	2.4	2516	0.504	3.4	2973	0.596	4.5
	11.8	1787	0.358	2.2	2303	0.461	3.4	2810	563	4.8	3310	0.663	6.4

Flow-adjusted waterside heating effect table. Heating circuit Δt = 10°F (Water in-out), nozzle pressure of 0.24, 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)	Cornice	ΔtK - 36°F			ΔtK - 45°F			ΔtK - 54°F			ΔtK - 63°F		
	L (ft)	p(BTU/hr)	p(gpm)	p(ft H_2O)	p(BTU/hr)	p(gpm)	p(ft H_2O)	p(BTU/hr)	p(gpm)	p(ft H_2O)	p(BTU/hr)	p(gpm)	p(ft H_2O)
10	6.0	617	0.190	0.3	752	0.190	0.3	886	0.190	0.3	1046	0.210	0.4
	8.0	-	-	-	-	-	-	-	-	-	-	-	-
	10.0	-	-	-	-	-	-	-	-	-	-	-	-
	11.8	-	-	-	-	-	-	-	-	-	-	-	-
20	6.0	818	0.190	0.3	1018	0.204	0.4	1274	0.255	0.6	1535	0.308	0.8
	8.0	967	0.194	0.5	1269	0.254	0.8	1575	0.315	1.2	1881	0.377	1.6
	10.0	1136	0.228	0.8	1480	0.297	1.3	1825	0.366	1.9	2167	0.434	2.6
	11.8	1265	0.253	1.2	1641	0.329	1.9	2014	0.404	2.7	2383	0.477	3.6
30	6.0	914	0.190	0.3	1202	0.241	0.5	1514	0.303	0.8	1828	0.366	1.1
	8.0	1202	0.241	0.7	1577	0.316	1.2	1953	0.691	1.7	2327	0.466	2.3
	10.0	1425	0.285	1.2	1850	0.371	2.0	2272	0.455	2.8	2688	0.539	3.8
	11.8	1582	0.317	1.8	2041	0.409	2.8	2494	0.500	3.9	2940	0.589	5.2
42	6.0	-	-	-	-	-	-	-	-	-	-	-	-
	8.0	1375	0.276	0.9	1812	0.363	1.5	2246	0.450	2.2	2674	0.536	2.9
	10.0	1691	0.339	1.7	2192	0.439	2.6	2685	0.538	3.8	3172	0.635	5.0
	11.8	1897	0.380	2.4	2439	0.489	3.8	2973	0.596	5.3	3503	0.702	7.1

Flow-adjusted waterside heating effect table. Heating circuit Δt = 10°F (Water in-out), nozzle pressure of 0.32, 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 0.40 Nozzle Pressure

Nozzle Pressure 0.40 H_2O		Water											
		ΔtK - 36°F			ΔtK - 45°F			ΔtK - 54°F			ΔtK - 63°F		
Q (CFM)	Cornice L (ft)	p(BTU/hr)	p(gpm)	p(ft H_2O)	p(BTU/hr)	p(gpm)	p(ft H_2O)	p(BTU/hr)	p(gpm)	p(ft H_2O)	p(BTU/hr)	p(gpm)	p(ft H_2O)
10	6.0	627	0.190	0.3	763	0.190	0.3	901	0.190	0.3	1070	0.214	0.4
	8.0	-	-	-	-	-	-	-	-	-	-	-	-
	10.0	-	-	-	-	-	-	-	-	-	-	-	-
	11.8	-	-	-	-	-	-	-	-	-	-	-	-
20	6.0	834	0.190	0.3	1043	0.209	0.4	1303	0.261	0.6	1566	0.314	0.8
	8.0	986	0.198	0.5	1292	0.259	0.8	1603	0.321	1.2	1914	0.384	1.6
	10.0	1159	0.232	0.9	1511	0.303	1.4	1865	0.374	2.0	2216	0.444	2.7
	11.8	1296	0.260	1.2	1682	0.337	2.0	2068	0.414	2.8	2449	0.491	3.8
30	6.0	950	0.190	0.3	1261	0.253	0.6	1580	0.317	0.8	1901	0.381	1.2
	8.0	1234	0.247	0.8	1613	0.323	1.2	1993	0.399	1.8	2370	0.475	2.4
	10.0	1451	0.291	1.3	1882	0.377	2.0	2310	0.463	2.9	2731	0.547	3.9
	11.8	1610	0.323	1.8	2078	0.416	2.8	2539	0.509	4.0	2994	0.600	5.4
42	6.0	1021	0.204	0.4	1373	0.275	0.7	1732	0.347	1.0	2091	0.419	1.4
	8.0	1440	0.289	1.0	1886	0.378	1.6	2329	0.467	2.3	2764	0.554	3.1
	10.0	1735	0.348	1.8	2240	0.449	2.7	2738	0.548	3.9	3228	0.647	5.2
	11.8	1932	0.387	2.5	2480	0.497	3.9	3019	0.605	5.5	3552	0.712	7.3

Flow-adjusted waterside heating effect table. Heating circuit Δt = 10°F (Water in-out), nozzle pressure of 0.40, 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 0.48 Nozzle Pressure

Nozzle Pressure 0.48 H_2O		Water											
		ΔtK - 36°F			ΔtK - 45°F			ΔtK - 54°F			ΔtK - 63°F		
Q (CFM)	Cornice L (ft)	p(BTU/hr)	p(gpm)	p(ft H_2O)	p(BTU/hr)	p(gpm)	p(ft H_2O)	p(BTU/hr)	p(gpm)	p(ft H_2O)	p(BTU/hr)	p(gpm)	p(ft H_2O)
10	6.0	-	-	-	-	-	-	-	-	-	-	-	-
	8.0	-	-	-	-	-	-	-	-	-	-	-	-
	10.0	-	-	-	-	-	-	-	-	-	-	-	-
	11.8	-	-	-	-	-	-	-	-	-	-	-	-
20	6.0	848	0.190	0.3	1069	0.214	0.4	1331	0.267	0.6	1598	0.320	0.9
	8.0	1005	0.201	0.5	1316	0.264	0.8	1632	0.327	1.2	1948	0.390	1.7
	10.0	1183	0.237	0.9	1543	0.309	1.4	1905	0.382	2.1	2265	0.454	2.8
	11.8	-	-	-	-	-	-	-	-	-	-	-	-
30	6.0	1001	0.201	0.4	1321	0.265	0.6	1646	0.330	0.9	1972	0.395	1.2
	8.0	1267	0.254	0.8	1649	0.330	1.3	2033	0.407	1.8	2412	0.483	2.4
	10.0	1477	0.296	1.3	1914	0.383	2.1	2347	0.470	3.0	2774	0.556	4.0
	11.8	1639	0.328	1.9	2115	0.424	2.9	2585	0.518	4.2	3048	0.611	5.6
42	6.0	1121	0.225	0.5	1499	0.300	0.8	1882	0.377	1.1	2261	0.453	1.6
	8.0	1505	0.301	1.1	1959	0.392	1.7	2409	0.483	2.4	2851	0.571	3.3
	10.0	1778	0.356	1.8	2287	0.458	2.8	2788	0.559	4.0	3282	0.658	5.4
	11.8	1967	0.394	2.6	2520	0.505	4.0	3063	0.614	5.6	3600	0.721	7.4

Flow-adjusted waterside heating effect table. Heating circuit Δt = 10°F (Water in-out), nozzle pressure of 0.48, 1 x Ø4” air connection.
For red values, the flow rate has been adjusted to the recommended minimum flow of 0.19 gpm.

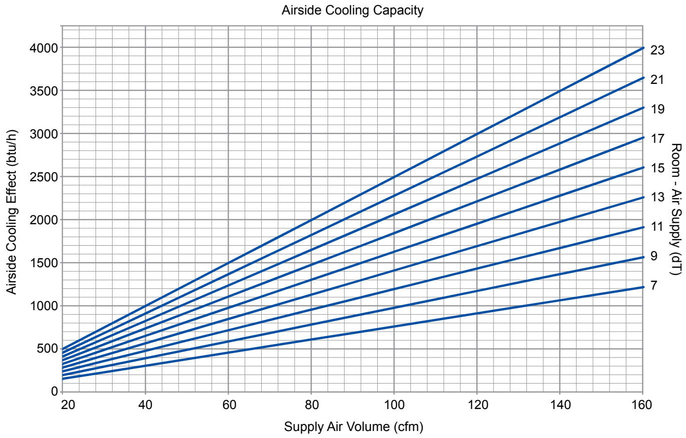
Air Cooling Effect

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.

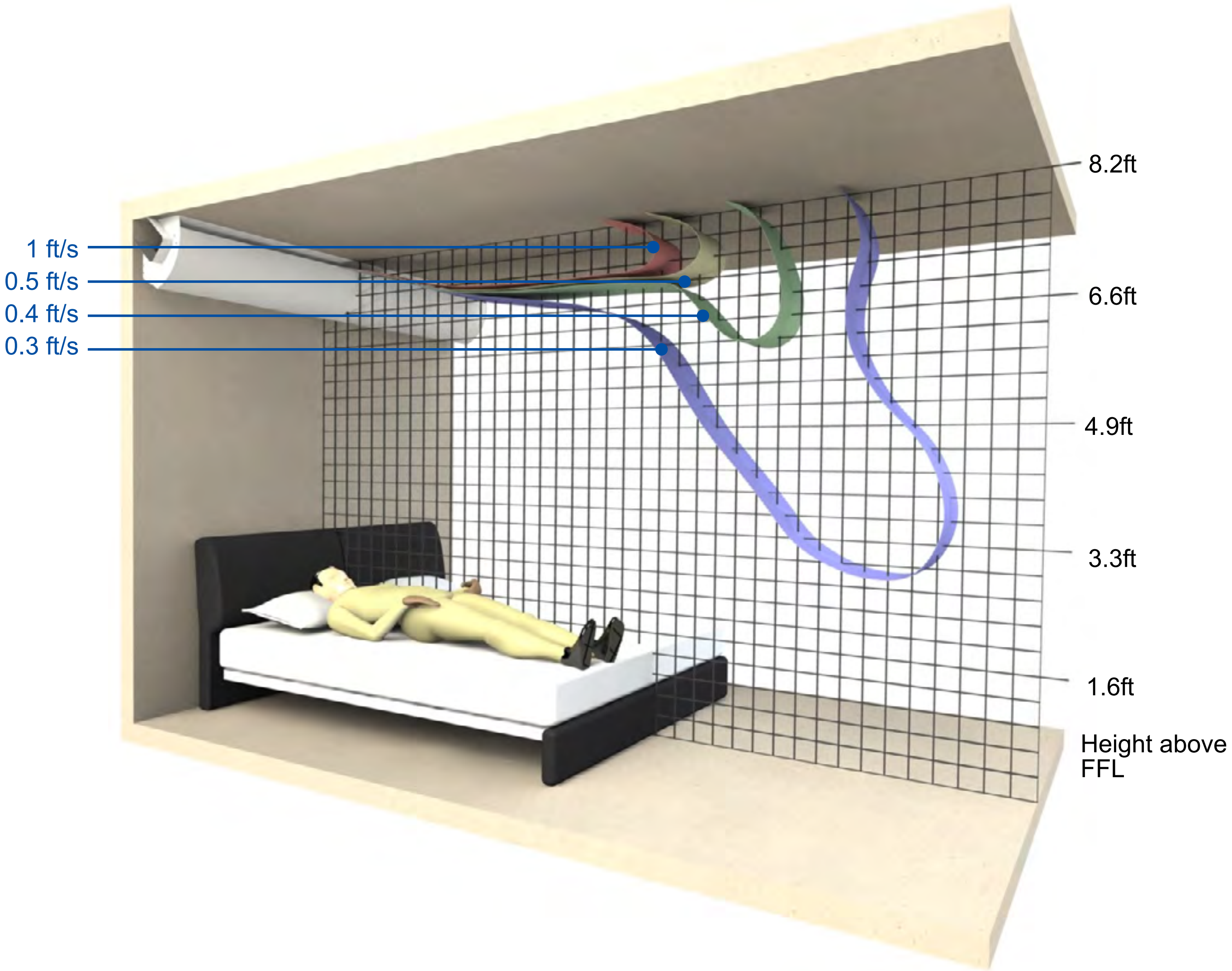
3. The remaining cooling effect has to be supplied by the beam.



Air cooling effect as a function of airflow.

Scatter Diagram

Fresh Air Volume 10.3 CFM / Active @ 0.3” inH_2O (Short throw)



Electric Radiant Heating

Electric Radiant Heating Option

Electric radiant heating is an available upgrade to the Cornice Chilled Beam unit. This option is available to any model options, be it in conjunction with condensation drip tray and / or LED light options. The width of the Cornice unit does however increase by 3 15⁄16" from the standard Cornice unit if electric radiant heating is chosen and the front fascia needs to be solid (not perforated) - see Fig 1.1 page 12 for details and page 15 for dimensions.

The removable front fascia of the Cornice unit is activated by an IP55 rated electric heating foil film applied to the inside of the fascia. Although IP55 is water jet resistant the electrical supply connection by the installed MUST incorporate a 30mA residual current device (RCD).

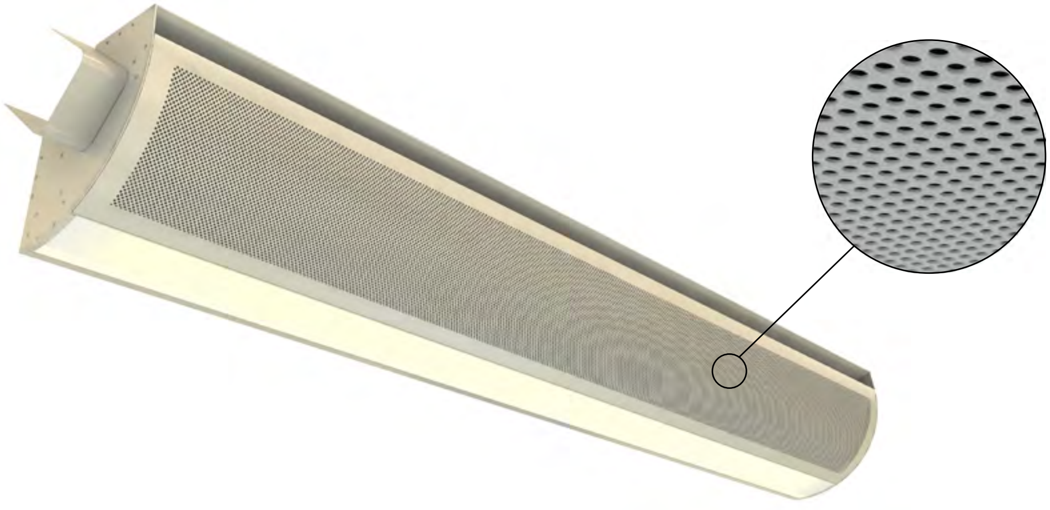
The surface temperature of the front fascia can reach upto 212°F and can yield the equivalent of 253.6 BTU/hr/ft², see available heating table for the different Cornice™ unit lengths available.

Important Note: When calculating your room heat losses, be mindful of the cooling effect from the supply air, and if supply air temperature is lower than the intended room condition in heating mode.

Available Heating			
Beam Length (ft)	**Heating Capacity (BTU/hr)**	**Voltage (V)**	**Surface Temp (°F)**
4.8	1791.4	120	Up to 212°F
6.4	2388.5	120	Up to 212°F
8.0	2985.6	120	Up to 212°F
9.8	3582.7	120	Up to 212°F

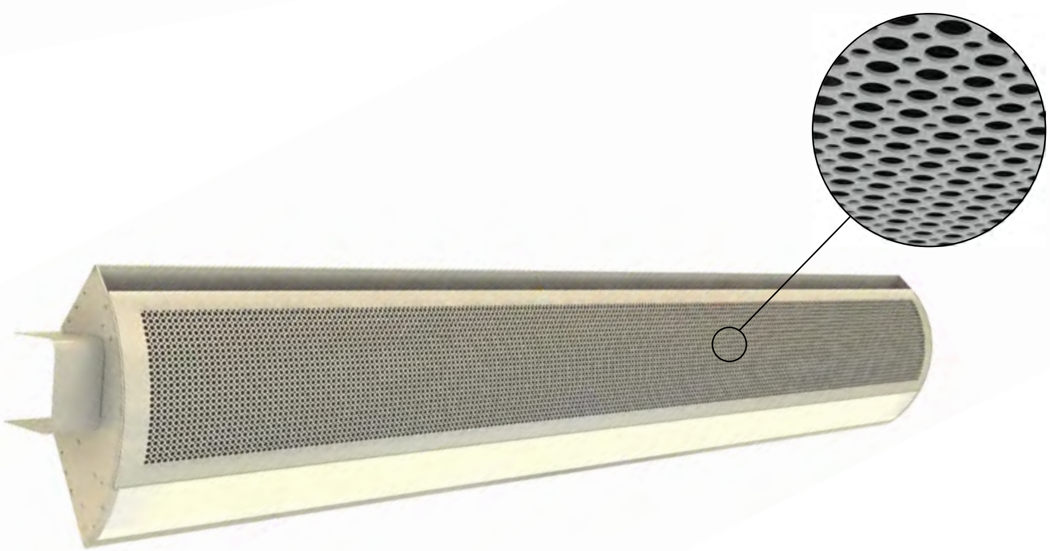
Fig 1.1
Cornice unit with Electric Radiant and LED Lighting - standard width plus 3 15⁄16" if radiant heating option chosen in addition to lighting - see page 15 for dimensions

Perforation Pattern Options



Dot Perforation
33% Free Area

Slot Perforation
45% Free Area



Double Dot Perforation
50% Free Area

Lighting Options

Integrated LED Lighting

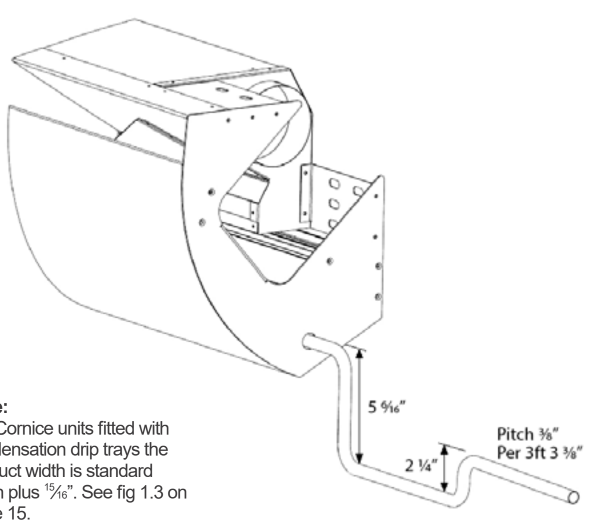
LED lighting can be integrated into FTF Group's Cornice™ Chilled Beam to provide a constant wash of light (that can be color changing LED's if so desired) or just one end section or both end sections illuminated as reading lights. White LED color temperatures 2700, 3000, 4000 and 6000k available.

Maintenance of the luminaires is greatly reduced given the long life expectancy of LED lighting as opposed to other forms of lighting. All LED luminaires factory fitted by FTF Group are 100% tested for electrical safety and functionality in accordance with BS 60598-1 prior to packaging and dispatch of the Cornice™ Chilled Beam unit.

Tests include:

- Earth Continuity Test
- Insulation Resistance Test.
- Polarity Check.
- Function Test.

Condensation Outlet



Note:
For Cornice units fitted with condensation drip trays the product width is standard width plus 15⁄16". See fig 1.3 on page 15.

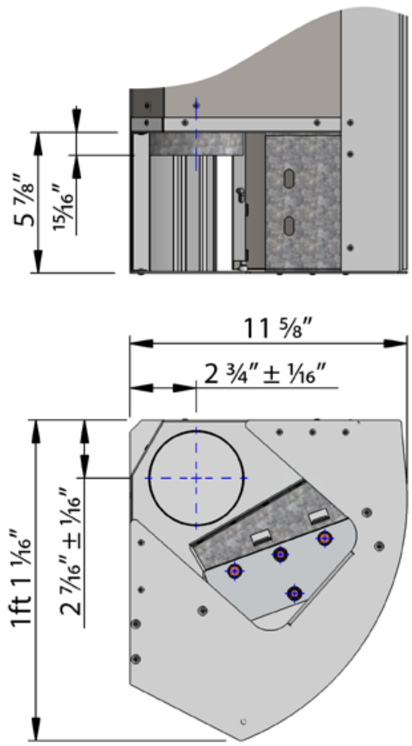
The condensation outlet should be connected to a soil stack or foul water system. Usually connection ends would be at the bathroom side wall when installed in a hotel application.

Ensure that when connecting to the condensation outlet the installation pipe work has a gradient of at least 25⁄32" fall per meter away from the connection end from the chilled beam condensate outlet. Also, it is good practice to form a water trap as recommended in the diagram opposite.

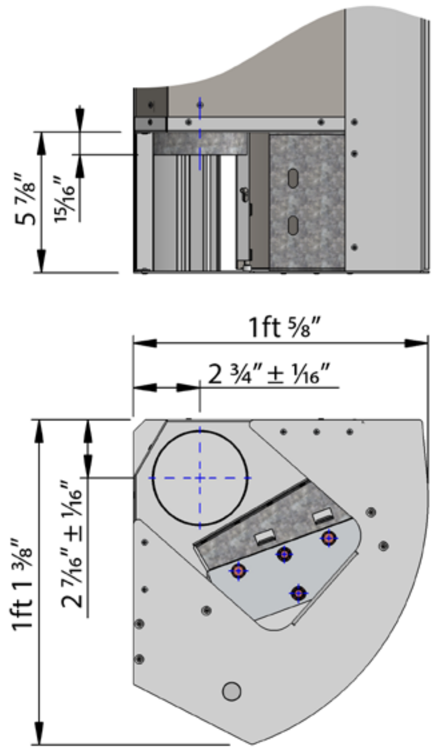
The use of Biocide tablets being used in the condensation tray / collection pan is also recommended to be used by the maintainer of the building systems as part of their planned maintenance as stagnant condensate accumulating in the collection pan / pipe work trap could provide habitant for various bacteria.

Product Dimensions

Standard Product

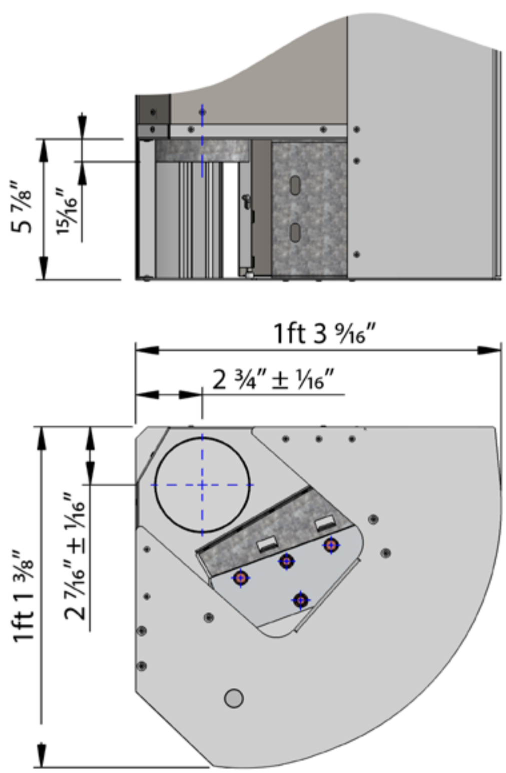


Cornice with Condensate Tray

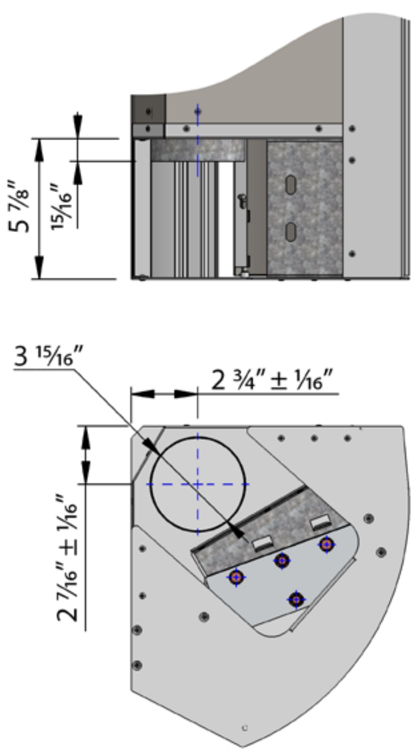


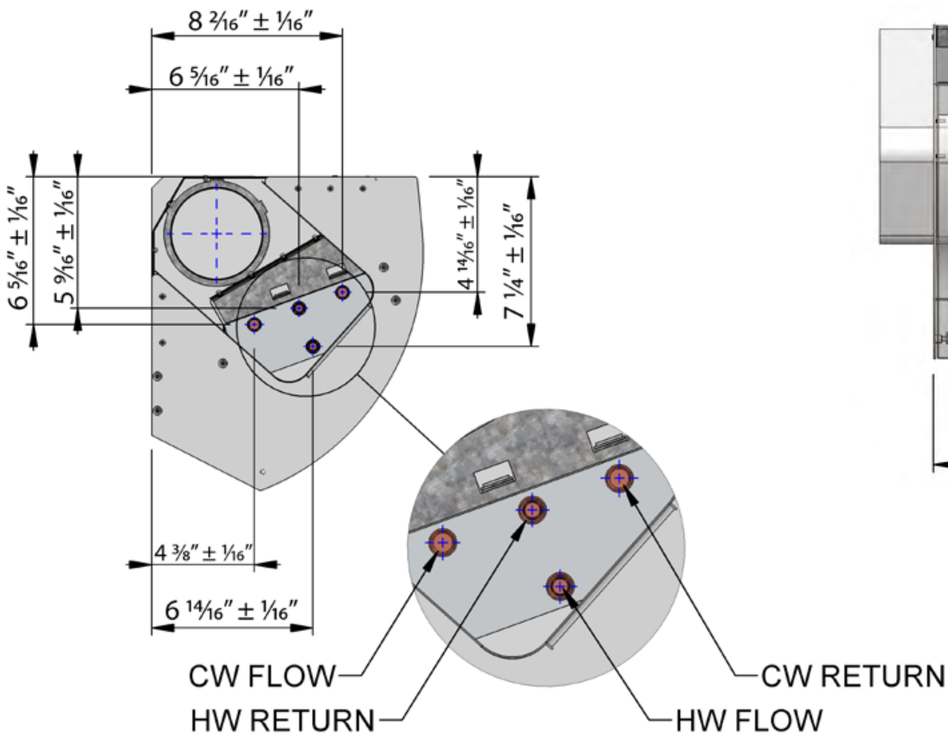
Cornice with Radiant Heating & Lighting

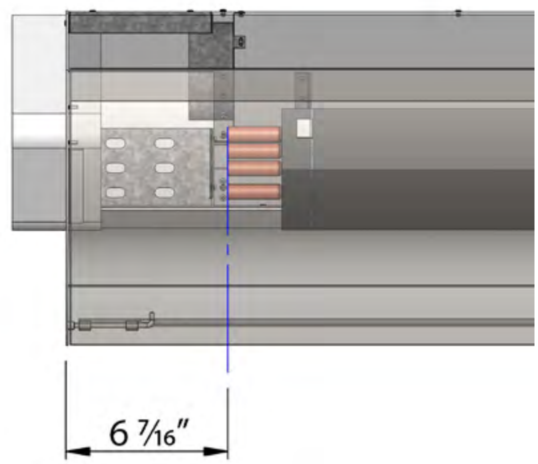
(and condensation tray if applicable)



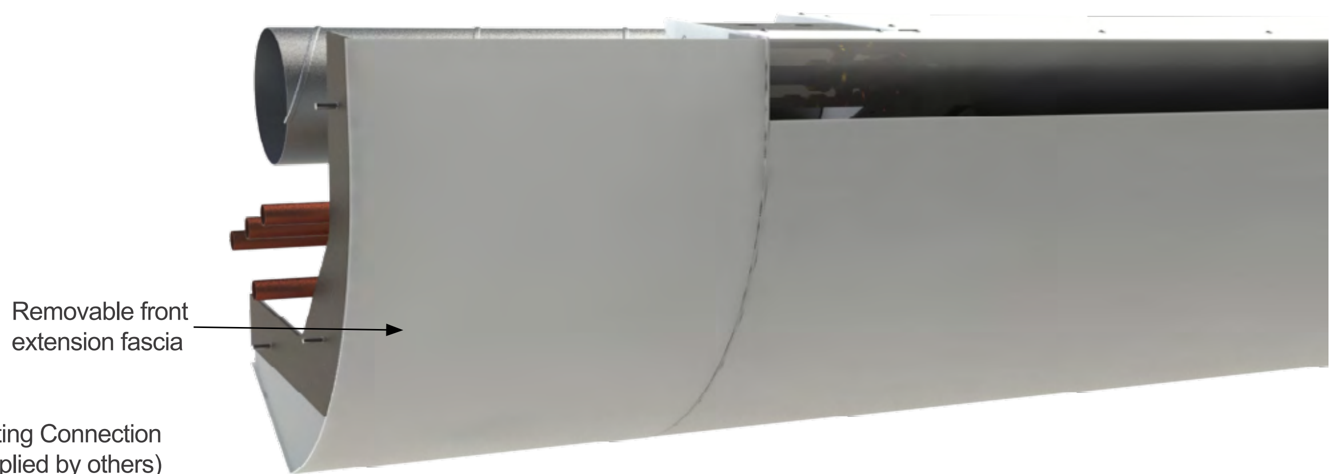
Air Connection

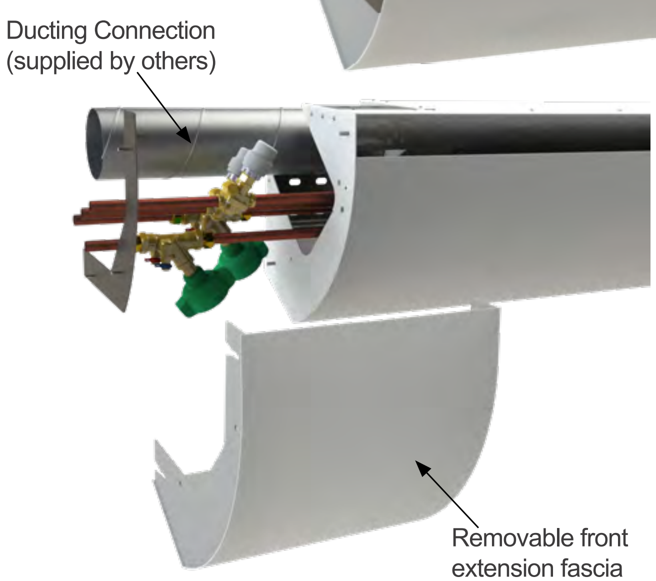


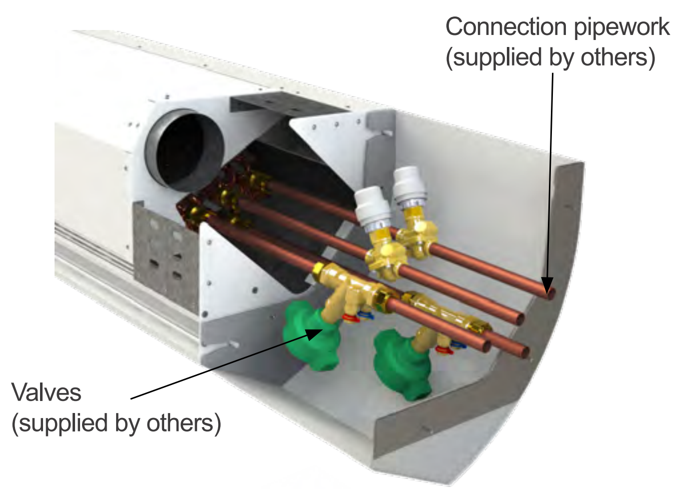




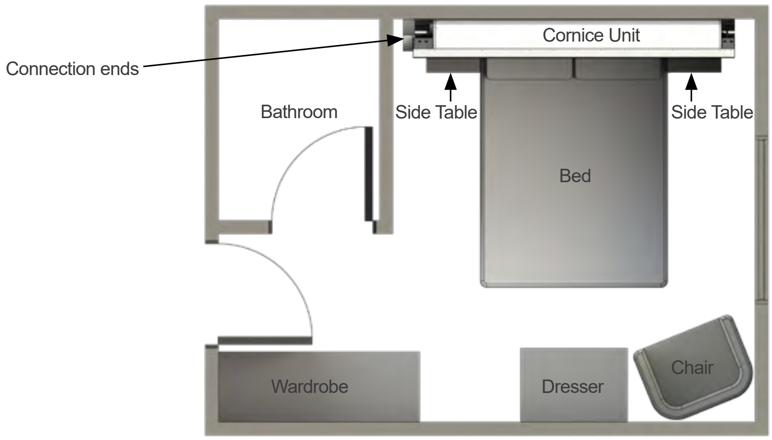
Note: Standard model only



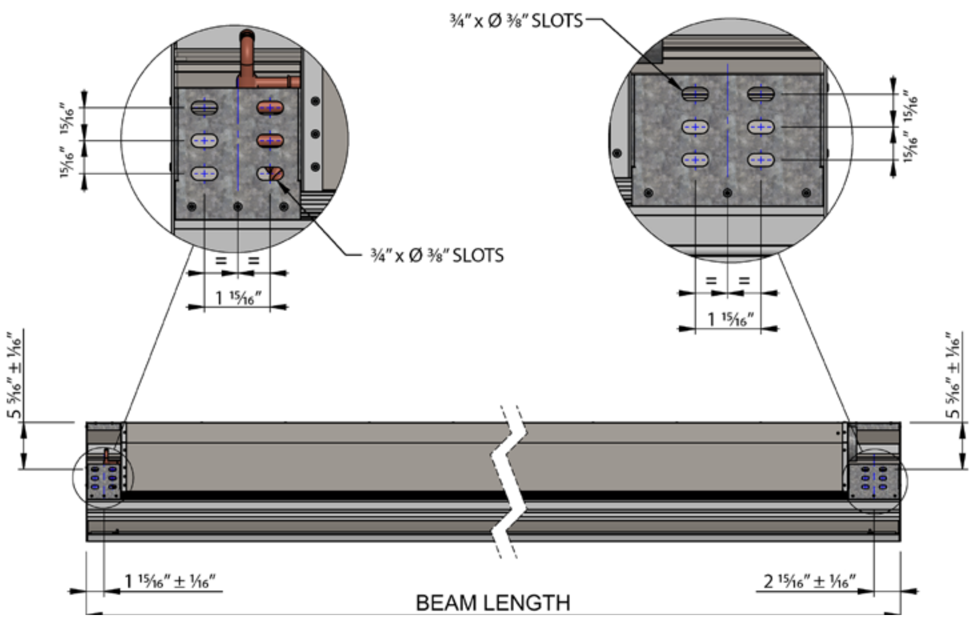


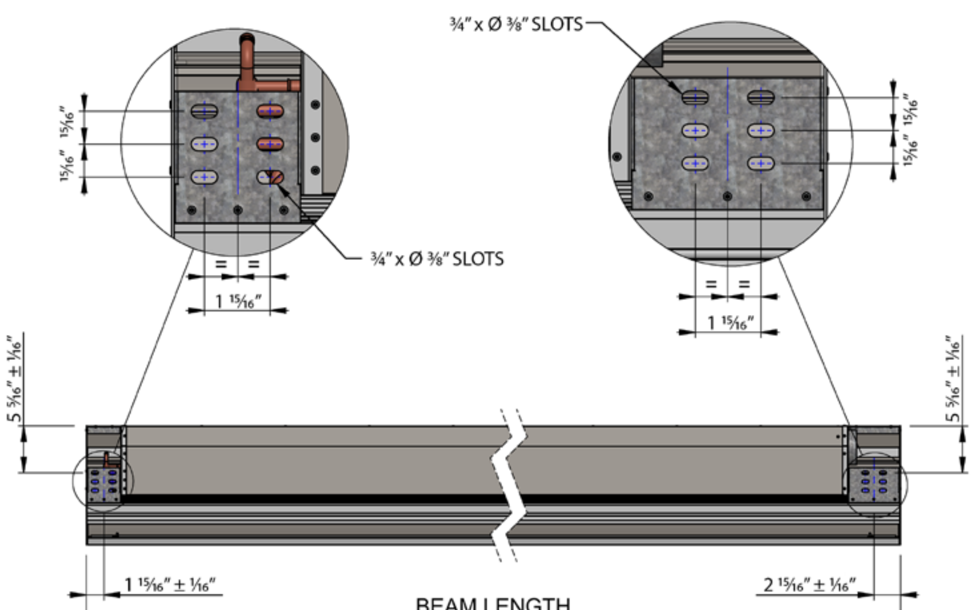


Mounting Details



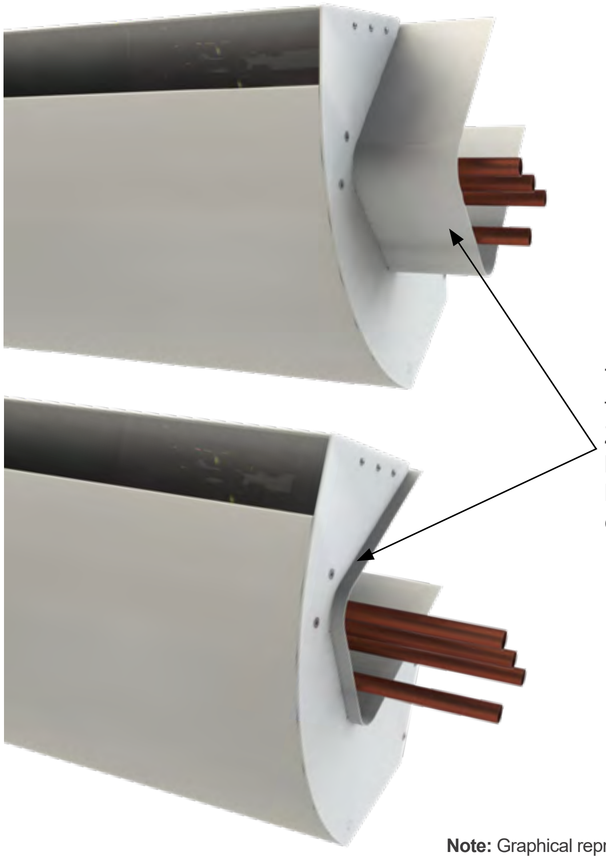
Suggested typical hotel room arrangement for connection ends.



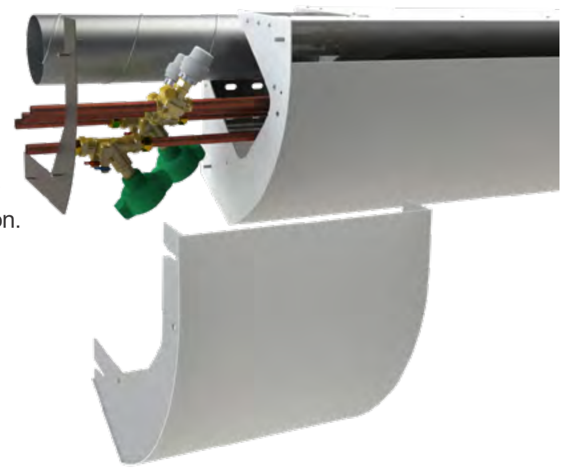


Note: Standard Cornice model only

Cornice Connection Covers



Telescopic extensions for final wall to wall installation. Zero to 2 15⁄16" adjustment length as standard, however longer lengths can be ordered.



Note: If separate short length removable front fascias required as detailed on page 16, these would require ordering separately along with quantities and lengths required.

Note: Graphical representation of Cornice Standard Model. Cornice model dimensions vary - please see page 15 for details.

Product Ordering Codes

2. Function

CO - Ceiling Int. Cooling Only
CH - Ceiling Int. Cooling & LTHW Heating
CR - Ceiling Int. Cooling & Radiant Heating

4. Underplate

7D - 7Ø & 4Ø Double Dot / 50% Free Area
4D - 4Ø DOT / 33% Free Area
5S - 5x35 Slot / 45% Free Area

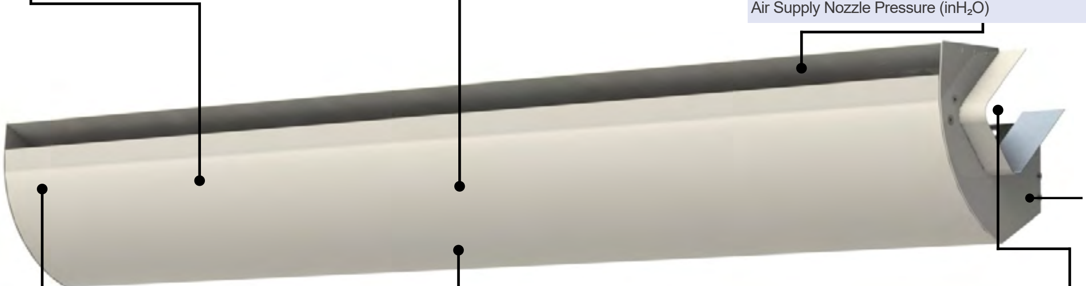
6. Air Supply / Discharge

Air Supply Volume (CFM)

25 04 L

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

Air Supply Nozzle Pressure (inH_2O)



1. Beam Type

C - Cornice Standard
CL - Cornice with Lighting
CC - Cornice with Condensation Outlet
CCL - Cornice with Condensate outlet and Lighting

3. Nominal Beam Length (ft / in)

5. Waterside Connection

Battery Manifold Types - C3/C4/C5/C6

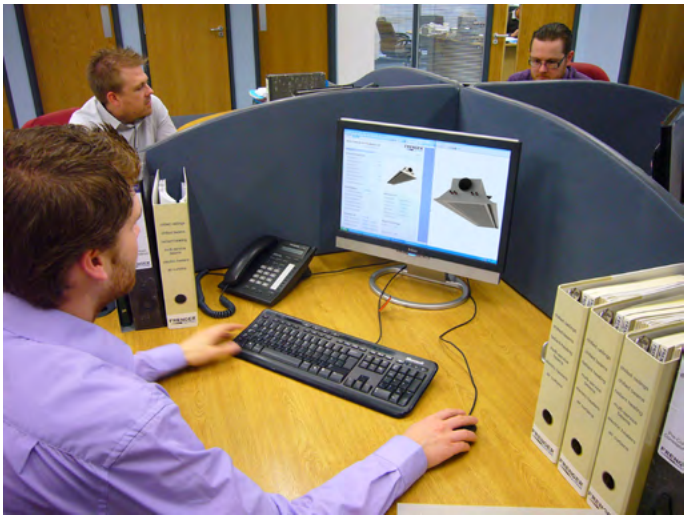
1/2 C3 H ← Orientation - H: Horizontal

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

Example: CN | CH | 4'00" | 7D | - H | 1/2C3H | 2504L

1 2 3 4 5 6

Calculation Program



Cornice Active Beam Data

Air Connection	1x4"	
Product Overall Length	8' 0"	ft Inches
Manifold Type	C4	
Air Discharge Throw	L	
Nozzle Static Pressure	0.4	" H2O
Fresh Air Supply Volume	42	CFM
LTHW Heating Function	Yes	
Radiant Heating (Electric)	No	
Lighting	No	
Condensation Drain Outlet	No	

Frenger's calculation program 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 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).

Design Conditions	Cooling		Heating	
Flow Water Temperature	57.0	°F	122.0	°F
Return Water Temperature	62.0	°F	104.0	°F
Air Supply Temperature	60.8	°F	66.2	°F
Average Room Condition	75.0	°F	69.8	°F
Thermal Gradient	32.9	°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 unless placed above a window - seek technical advice from FTF Group.

Performance Data	Cooling		Heating	
Room - Mean Water dT	8.50	°F	24.00	°F
Air On Coil - Mean Water dT	8.96	°F	21.00	°F
Waterside Performance	562	BTU/h	447	BTU/h
Waterside Mass Flowrate	0.045	gpm	0.011	gpm
Waterside Pressure Drop	1.8	ft H2O	1.1	ft H2O
Airside Performance	203	BTU/h	-96	BTU/h
Total Sensible Performance	**765**	**BTU/h**	**351**	**BTU/h**
Sound Effect Lw	<35	dB(A)		

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

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

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

Active Chilled Beam Calculation Tool

FTF GROUP® Climate

Is this the latest version?

version iV1.3.1

Project Ref.

Cornice Active Beam Data		
Air Connection	1x4"	
Product Overall Length	8'00"	ft inches
Manifold Type	C4	
Air Discharge Throw	L	
Nozzle Static Pressure	0.4	"H2O
Fresh Air Supply Volume	42	CFM
LTHW Heating Function	Yes	
Radiant Heating (Electric)	No	
Lighting	No	
Condensation Drain Outlet	No	

Design Conditions	Cooling		Heating	
Flow Water Temperature	57.0	°F	122.0	°F
Return Water Temperature	62.0	°F	104.0	°F
Air Supply Temperature	60.8	°F	66.2	°F
Average Room Condition	75.0	°F	69.8	°F
"Air On" Thermal Gradient	32.9	°F		
Room Relative Humidity	50.0	%		

Dimensional Data		
Width x Depth	11 1/2 x 8 1/4	Inches
Overall Length	8' 0"	ft Inches
Water Volume	0.5	Gal
Dry Weight	64.2	lb
CW Connection	1/2	"
LTHW Connection	1/2	"

Performance Data	Cooling		Heating	
Room - MWT	15.50	°F	43.20	°F
Air On Coil - MWT	48.40	°F	37.80	°F
Waterside Performance	7335	BTU/h	1548	BTU/h
Water Mass Flowrate	2.929	gpm	0.172	gpm
Waterside Pressure Drop	7.2	ft H2O	0.4	ft H2O
Airside Performance	2124	BTU/h	-325	BTU/H
Total Sensible Performance	**9458**	**BTU/h**	**1224**	**BTU/h**
Sound Effect LW	< 35	dB(A)		

Design Check (Warnings)		
Supply Air	OK	
Cooling Circuit	OK	
Heating Circuit	OK	
Turn Down Vol @ 40Pa	26.6	CFM
Calculated Dew Point	55.1	°F

Model Ref: CNCH8' 0"-1x4"H1/2"C4H-420.4L

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.

Project Specific Testing Facility

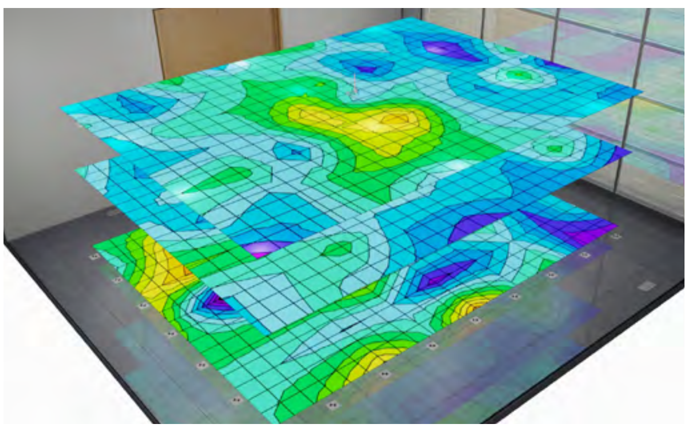
The FTF Group have 3 number state-of-the-art Climatic Testing Laboratories at one if its subsidiary companies predominantly situated at the prestigious Pride Park. Each laboratory has internal dimensions of 20.7ft x 18.7ft x 10.8ft high and includes a thermal wall so that both core and perimeter zones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

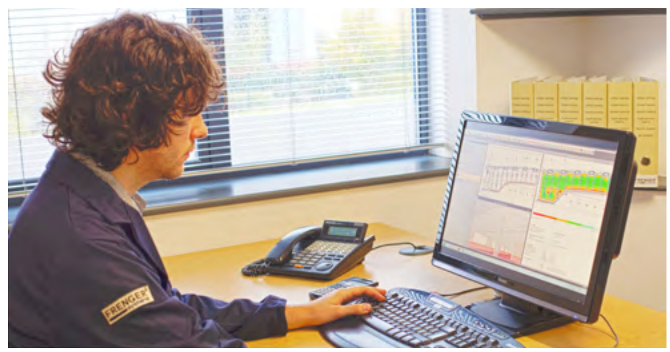
The intensity distribution is obtained by the use of a Goniophotometer to measure the intensity of light emitted from the surface of the fitting at pre-determined angles. The light intensity is measured using either a photometer with a corrective spectral response filter to match the CIE standard observer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

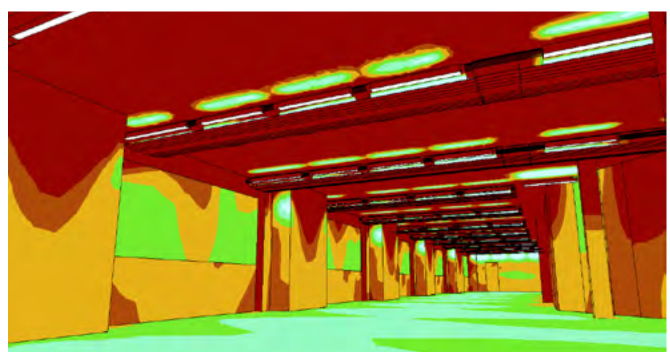
Luminaire outputs are measured using out integrating sphere for small luminaires or out large integrator room for large fittings and Multiservice Chilled Beam. For both methods we can use traceable calibrated radiant flux standards for absolute comparisons.

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.

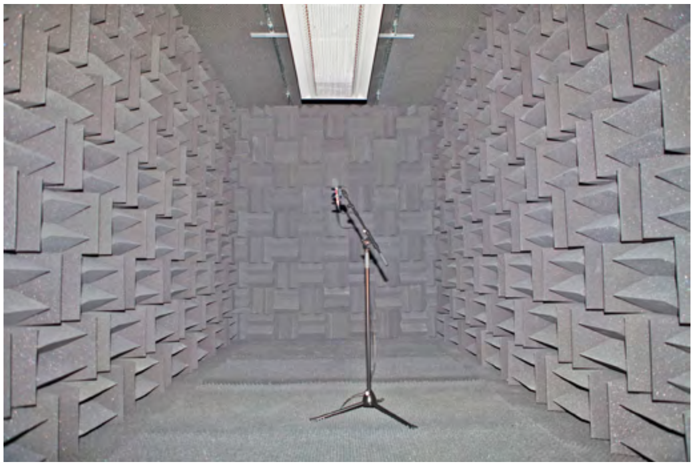
The FTF Groups technically facility also conducts photometric tests in accordance with CIE 127:2007 and BS EN 13032-1 and sound engineering practice as applicable. During the course of these tests suitable temperature measurements of parts of LEDs can be recorded. These recorded and plotted temperature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

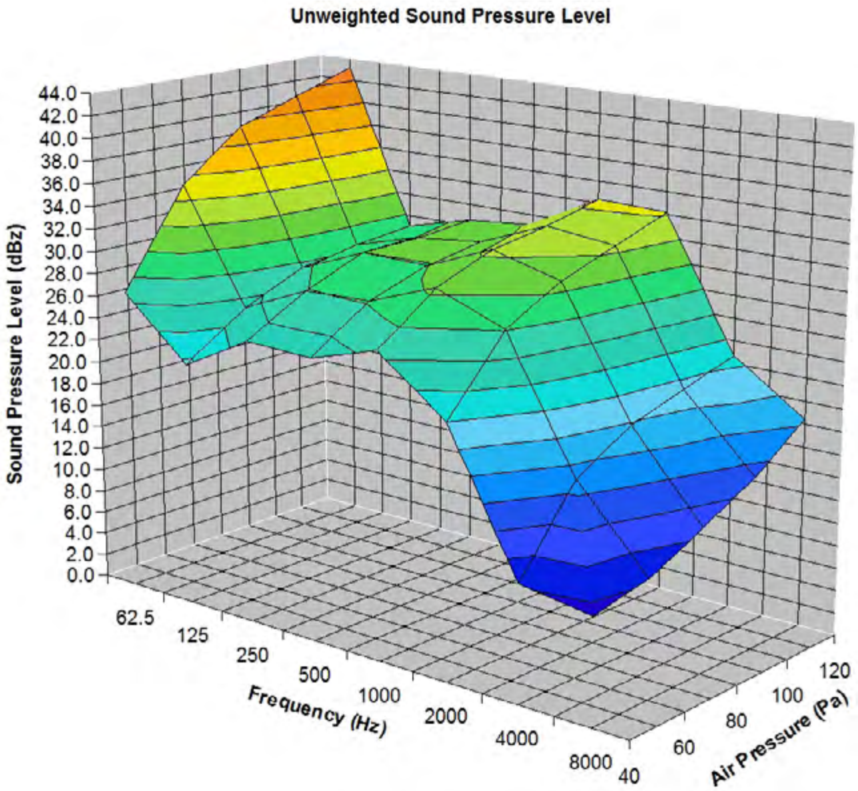


The use of acoustic absorbing material within the test room provides the simulation of a quiet open space without "reflections" which helps to ensure sound measurements from the sound source are accurate, in addition the acoustic material also helps reduce external noise entering the test room meaning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

American Office

FTF Group Climate
1501 Broadway, Times Square
12th Floor
New York
NY 10036
United States of America

tel: +00 1 646 571 2151
fax: +00 1 646 571 2001
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
fax: +44 0 1332 381 054
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
fax: +61 2 9006 1010
sales@frenger.com.au
www.frenger.com.au

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