Entropic HVAC sizing chart

Fresh air volume flow rate (m³/s)	(m³/hr)	Number of people served by fresh air at 12 l/s/person (Persons)	Office area served by fresh air at 1 person/8m² (m²)
0.05	180	4	33
0.1	360	8	67
0.2	720	17	133
0.3	1,080	25	200
0.4	1,440	33	267
0.5	**1,800**	**42**	**333**
0.6	2,160	50	400
0.7	2,520	58	467
0.8	2,880	67	533
0.9	3,240	75	600
1.0	**3,600**	**83**	**667**
1.25	4,500	104	833
1.5	5,400	125	1,000
1.75	6,300	146	1,167
2.0	7,200	167	1,333
2.5	**9,000**	**208**	**1,667**
3.0	10,800	250	2,000
3.5	12,600	292	2,333
4.0	14,400	333	2,667
4.5	16,200	375	3,000
5.0	**18,000**	**417**	**3,333**
5.5	19,800	458	3,667
6.0	21,600	500	4,000
6.5	23,400	542	4,333
7.0	25,200	583	4,667
7.5	**27,000**	**625**	**5,000**
8.0	28,800	667	5,333
8.5	30,600	708	5,667
9.0	32,400	750	6,000
9.5	34,200	792	6,333
10.0	**36,000**	**833**	**6,667**

Duct size

2m/s ø (mm)	2m/s ☐ w x h (mm)	3m/s ø (mm)	3m/s ☐ w x h (mm)	5m/s ø (mm)	5m/s ☐ w x h (mm)	7.5m/s ø (mm)	7.5m/s ☐ w x h (mm)
200	300 x 100	160	300 x 100	125	200 x 100	100	100 x 100
250	300 x 150	200	300 x 150	160		125	200 x 100
350	500 x 200	315	400 x 200	250	300 x 150	200	300 x 100
400	500 x 300	350	500 x 200		400 x 150	250	300 x 150
500	600 x 400	400	500 x 300	315	400 x 200		300 x 200
630	**600 x 500**		**600 x 300**	**355**	**500 x 200**	**315**	400 x 200
		500	800 x 300	400	400 x 300		
					500 x 300	355	500 x 200
			800 x 400	500	600 x 300	400	400 x 300
		630					600 x 200
					500 x 400		**500 x 300**
				630	600 x 400	500	600 x 300
					800 x 400		500 x 400
				710	800 x 500	630	600 x 400
							600 x 500
				800	**1000 x 500**	710	800 x 500
				900	1000 x 600		
					1200 x 600	800	800 x 600
				1000	1000 x 800		
					1200 x 800	900	1000 x 600
				1250	1200 x 1000	1000	1000 x 800
					1600 x 1000		1200 x 800
						1250	1200 x 1000
					2000 x 1000		1600 x 800

Heat recovery unit (HRV) selection

Thermal wheel units Model	w x h x l (mm)	Plate heat exchanger units Model	w x h x l (mm)
TW-0.05	383 x 362 x 972	PHE-0.1	850 x 344 x 1700
TW-0.1	532 x 594 x 1455		
TW-0.2	700 x 720 x 1510	PHE-0.3	1150 x 385 x 1750
TW-0.6	**1800 x 1600 x 890**	PHE-0.4	1250 x 470 2100
		PHE-0.7	1700 x 610 x 2355
TW-0.8	1100 x 1440 x 2100		
		PHE-0.9	1010 x 1440 x 2850
TW-1.2	**1100 x 1740 x 2350**	PHE-1.2	1320 x 1740 x 3200
TW-1.5	1400 x 1740 x 2350	PHE-1.7	1600 x 1740 x 3200
TW-2.0	1300 x 2400 x 3150		
TW-2.5	**1540 x 2400 x 3150**	PHE-2.5	1320 x 2400 x 4700
TW-3.5	1640 x 3100 x 3550	PHE-3.0	1600 x 2400 x 4700
TW-4.0	2000 x 2400 x 3150	PHE-4.0	1910 x 2400 x 4700
		PHE-4.5	1930 x 3240 x 6860
TW-5.5	**2570 x 3300 x 4840**	**PHE-5.0**	**1930 x 3860 x 7360**
		PHE-6.0	1930 x 3860 x 7930
TW-6.5	2570 x 3300 x 4900		
		PHE-7.5	2570 x 3920 x 7840
TW-9.0	2570 x 3920 x 5120	PHE-8.5	2570 x 4520 x 9420
TW-10	2570 x 4520 x 5920	PHE-10	2570 x 5140 x 9510

Fan coil selection

FCU cooling power[3] (kW)	FCU Model	Qty of FCUs	CHW flow at ΔT=6K (l/s)	CHW Pipe Ø (mm)	LPHW flow at ΔT=20K (l/s)	LPHW pipe Ø (mm)
3	CRS-ECM34+1 (Cooling water flow temperature 6°C, Air off temperature 13°C, Medium speed 6.5 of 10 (i.e. 6.5V), Room 22°C, +/- 2°C with a vertical temp difference of 1°C/vertical m)	1	0.24	25	0.01	10 (15)
7		2	0.48	32	0.03	
13		3	0.72		0.04	
20		4	0.96	40	0.05	
27		6	1.44		0.08	
33		**7**	**1.68**	**50**	**0.09**	**15**
40		8	1.92		0.10	
47		10	2.40		0.13	
53		11	2.64		0.14	
60		12	2.88		0.16	
67		**14**	**3.36**	**65**	**0.18**	**20**
83		17	4.08		0.22	
100		20	4.80		0.26	
117		24	5.76		0.31	
133		27	6.48	80	0.35	25
167		**34**	**8.16**		**0.44**	
200		40	9.60		0.52	
233		47	11.28	100	0.61	
267		54	12.96		0.70	
300		60	14.40		0.78	
333		**67**	**16.08**		**0.87**	32
367		74	17.76		0.96	
400		80	19.20		1.04	
433		87	20.88		1.13	
467		94	22.56	125	1.22	
500		**100**	**24.00**		**1.30**	40
533		107	25.68		1.39	
567		114	27.36		1.48	
600		120	28.80		1.56	
633		127	30.48	150.0	1.65	50
667		**134**	**32.16**		**1.74**	

Diffusers for fan coils selection

600x600 diffuser (Model)	1200x300 diffuser (Model)	1200x300 nozzle diffuser (Model)	Exposed diffuser (Model)	Qty of diffusers
JRP/S-200,OM=YS,AT=P,IN=4,CO=W,ZT=N Sw irl diffuser with perforated face-plate c/w integrated acoustically lined plenum	DAC/1-1200-300, CO=W, EP=S + PDA-200 plenum Architectural, high induction diffuser c/w acoustically lined plenum box	SLS-1200-300+PDA-200 High induction, variable throw nozzle diffuser c/w acoustically lined plenum	JDB/C-200 diffuser + TRH-200-200 plenum Exposed diffuser with 2800mm coanda plate c/w acoustically lined plenum box	3
				6
				9
				12
				18
				21
				24
				30
				33
				36
				42
				51
				60
				72
				81
				102
				120
				141
				162
				180
				201
				222
				240
				261
				282
				300
				321
				342
				360
				381
				402

Heatpump / chiller for fan coil system

Chiller power[4] (kW)	ELEC power	Chiller model	Chiller dims w x h x l (mm)	CHW flow (l/s)	Pipe Ø[2] (mm)
4	2	HCY-20	978 x 985 x 380	0.27	25
9	3	HCY-31	1420 x 1288 x 550	0.39	
18	6	HCY-81	1960 x 1203 x 810	0.80	32
26	10	HCY-131	2060 x 1417 x 1112	1.37	40
35	11	HCY-171		1.58	50
43	**14**	**HCY-211**	2470 x 1595 x 1112	**1.84**	
52	18	HCY-301		2.35	
60	21	HTAT-HE-30	1110 x 2155 x 2507	3.03	65
69				3.03	
77	23	HTAT-HE-35		3.25	
86	**29**	**HTAT-HE-40**		**3.94**	
108	31	HTAT-HE-50		4.61	
129	40	HTAT-HE-60	1110 x 2155 x 3407	5.61	80
151	45	HTAT-HE-65		6.44	
173	55	HAST-HE-80	2188 x 2150 x 3495	8.06	
216	**73**	**HAST-HE-110**		**10.08**	
258	79	HAST-HE-120	2188 x 2150 x 4595	11.58	100
301	91	HAST-HE-130		13.08	
346	102	HAST-HE-140		14.61	
387	118	2 x HAST-HE-90	2188 x 2150 x 4595 each	16.94	
429	**146**	2 x HAST-HE-110		20.17	
473					
515	158	2 x HAST-HE-120		23.17	
558	182	2 x HAST-HE-130		26.17	125
603					
645	**204**	2 x HAST-HE-140		29.22	
686					
727	237	3 x HAST-HE-120		34.75	150
773					
815					
856	**273**	**3 x HAST-HE-130**		**39.25**	

Chilled beam selection (4-pipe, heating and cooling)

Fresh air volume flow rate (m³/s)	(m³/hr)	Number of people served by fresh air at 12 l/s/person (Persons)	Office area served by fresh air at 1 person/8m² (m²)
0.05	180	4	33
0.1	360	8	67
0.2	720	17	133
0.3	1,080	25	200
0.4	1,440	33	267
0.5	**1,800**	**42**	**333**
0.6	2,160	50	400
0.7	2,520	58	467
0.8	2,880	67	533
0.9	3,240	75	600
1.0	**3,600**	**83**	**667**
1.25	4,500	104	833
1.5	5,400	125	1,000
1.75	6,300	146	1,167
2.0	7,200	167	1,333
2.5	**9,000**	**208**	**1,667**
3.0	10,800	250	2,000
3.5	12,600	292	2,333
4.0	14,400	333	2,667
4.5	16,200	375	3,000
5.0	**18,000**	**417**	**3,333**
5.5	19,800	458	3,667
6.0	21,600	500	4,000
6.5	23,400	542	4,333
7.0	25,200	583	4,667
7.5	**27,000**	**625**	**5,000**
8.0	28,800	667	5,333
8.5	30,600	708	5,667
9.0	32,400	750	6,000
9.5	34,200	792	6,333
10.0	**36,000**	**833**	**6,667**

Beam cooling power[5] (kW)	Recessed Constant vol (Model)	Recessed VAV beam (Model)	Exposed Constant vol (Model)	Exposed VAV beam (Model)	Hotel bedroom (Model)	Qty of chilled beams	Cooling water (16°C) flow (l/s)	Cooling water pipe Ø (mm)	Heating water (40°C) Beam power[5] (kW)	Heating water flow (l/s)	Heating water pipe Ø (mm)
2	R6B-600-3000	CSW	CBH	CBQ	CBH	3	0.3	25	2	0.06	15
5						5	0.5	32	4	0.10	20
9						9	0.9	40	7	0.18	
14						13	1.3		10	0.26	25
19						17	1.7	50	14	0.34	
24						**21**	**2.1**		**17**	**0.42**	
28						25	2.5		20	0.50	
33						30	3.0		24	0.60	32
38						34	3.4	65	27	0.68	
43						38	3.8		30	0.76	
47						**42**	**4.2**		**33**	**0.84**	40
59						52	5.2		41	1.04	
71						63	6.3	80	50	1.26	
83						73	7.3		58	1.46	
95						84	8.4		67	1.68	
118						**104**	**10.4**		**83**	**2.08**	
142	CBX	RE6-600	CEE	REE	CHB	125	12.5	100	100	2.50	
166						146	14.6		116	2.92	
189						167	16.7		133	3.34	65
213						188	18.8		150	3.76	
237						**208**	**20.8**	125	**166**	**4.16**	
260						229	22.9		183	4.58	
284						250	25.0		199	5.00	
308						271	27.1		216	5.42	
331						292	29.2		233	5.84	
355	**CBD-300-3000**				**CHH**	**312**	**31.2**		**249**	**6.24**	80
379						333	33.3		265	6.66	
402						354	35.4	150	282	7.08	
426						375	37.5		299	7.50	
450						396	39.6		316	7.92	100
473						**416**	**41.6**		**332**	**8.32**	

Heatpump / chiller for chilled beam system

Chiller power[7] (kW)	ELEC power	Chiller model	Chiller dims w x h x l (mm)	CHW flow 13°C (l/s)	Pipe Ø[2+8] (mm)
4	2	HCY-20	978 x 985 x 380	0.33	25
7					
15	4	HCY-51	1420 x 1288 x 550	0.69	32
22	6	HCY-81	1960 x 1203 x 810	0.97	40
30	8	HCY-101		1.28	
37	**10**	**HCY-131**	2060 x 1417 x 1112	**1.65**	
45	11	HCY-171		1.91	50
52	15	HCY-211		2.22	
60	16	HCY-251	2470 x 1595 x 1112	2.56	
67	19	HCY-301		2.83	
75	**22**	**HTAT-HE-30**		**3.69**	65
93	24	HTAT-HE-35	1110 x 2155 x 2507	3.94	
112	30	HTAT-HE-40		4.72	
131	33	HTAT-HE-50	1110 x 2155 x 3407	5.58	80
149	42	HTAT-HE-60		6.72	
187	**53**	**HAST-HE-70**	2188 x 2150 x 3495	**8.42**	
224	59	HAST-HE-80		9.75	100
261	78	HAST-HE-110	2188 x 2150 x 4595	12.17	
298	83	HAST-HE-120		13.94	
336	97	HAST-HE-130		15.69	
373					
410	110	HAST-HE-140		17.53	
448	118	2 x HAST-HE-80	2188 x 2150 x 3495 each	19.50	125
485	126	2 x HAST-HE-90		20.44	
522	146	2 x HAST-HE-110		24.33	
560	**146**				
597	166	2 x HAST-HE-120	2188 x 2150 x 4595 each	27.89	
634					
672	192	2 x HAST-HE-130		31.39	150
709					
746					

Displacement diffusers

Area served by displacement vent[9] (m²)	Room cooling power of displacement[9] (kW)	Floor diffusers (Model)	Floor standing diffusers (Model)	Auditorium and lecture theatre diffusers (Model)	(Qty)
9	1	GSP data centre	ZCI	JRF-step	3
17	1				7
35	2				13
52	4				20
70	5				27
87	**6**				**33**
105	7				40
122	9				47
140	10		ZCO		53
157	11				60
175	**12**				**67**
219	15				83
262	18				100
306	21	FLE			117
350	24		ZRE	BCF	133
437	**31**				**167**
525	37				200
612	43				233
699	49				267
787	55				300
874	**61**				**333**
962	67				367
1,049	73	FLU			400
1,137	80		ZSC	DSM	433
1,224	86				467
1,311	**92**				**500**
1,399	98				533
1,486	104				567
1,574	110				600
1,661	116				633
1,749	**122**		**ZRW**		**667**

Heatpump / chiller for displacement vent

Chiller power[10] (kW)	ELEC power	Chiller model	Chiller dims w x h x l (mm)	CHW flow 15°C (l/s)	Pipe Ø[2] (mm)
1	2	HCY-20	978 x 985 x 380	0.34	25
1					
2					
4					
5					
6					
7					
9	3	HCY-31		0.50	32
10					
11					
12			**1420 x 1288 x 550**		
15	4	HCY-51		0.73	
18	6	HCY-71		0.93	40
21					
24		HCY-81	1960 x 1203 x 810	1.03	
31	**8**	**HCY-101**		**1.35**	
37	11	HCY-131	2060 x 1417 x 1112	1.74	50
43	12	HCY-171		2.01	
49	15	HCY-211	2470 x 1595 x 1112	2.34	
55					
61	**17**	**HCY-251**		**2.71**	
67	20	HCY-301		2.97	
73					
80	23	HTAT-HE-30		3.92	65
86					
92			**1110 x 2155 x 2507**		
98	25	HTAT-HE-35		4.17	
104					
110	31	HTAT-HE-40		4.97	
116					**80**
122	**33**	**HTAT-HE-50**	**1110 x 2155 x 3407**	**5.92**	

Pipe sizes

at <300 Pa/m pressure drop

(kW)	ΔT = 3K flow (l/s)	ΔT = 3K pipe Ø (mm)	ΔT = 6K flow (l/s)	ΔT = 6K pipe Ø (mm)	ΔT = 10K flow (l/s)	ΔT = 10K pipe Ø (mm)	ΔT = 20K flow (l/s)	ΔT = 20K pipe Ø (mm)	ΔT = 30K flow (l/s)	ΔT = 30K pipe Ø (mm)
2	0.16	20	0.08	15	0.05	15	0.02	10	0.02	10
4	0.32	25	0.16	20	0.10	20	0.05	15	0.03	
6	0.48		0.24	25	0.14		0.07		0.05	
8	0.63	32	0.32		0.19		0.10		0.06	15
10	**0.79**		**0.40**		**0.24**	25	**0.12**	20	**0.08**	
15	1.19	40	0.60	32	0.36		0.18		0.12	20
20	1.59	50	0.79		0.48	32	0.24	25	0.16	
30	2.38		1.19	40	0.71		0.36		0.24	25
40	3.17		1.59	50	0.95	40	0.48		0.32	
50	**3.97**	65	**1.98**		**1.19**		**0.60**	32	**0.40**	
60	4.76		2.38		1.43		0.71		0.48	
70	5.56		2.78		1.67	50	0.83		0.56	32
80	6.35	80	3.17	65	1.90		0.95	40	0.63	
90	7.14		3.57		2.14		1.07		0.71	
100	**7.94**	100	**3.97**		**2.38**		**1.19**		**0.79**	
150	11.90		5.95	80	3.57	65	1.79	50	1.19	40
200	15.87		7.94		4.76		2.38		1.59	50
250	19.84	125	9.92	100	5.95	80	2.98		1.98	
300	23.81		11.90		7.14		3.57	65	2.38	
350	27.78		13.89		8.33		4.17		2.78	
400	31.75	150	15.87		9.52		4.76		3.17	65
450	**35.71**		**17.86**	125	**10.71**	100	**5.36**	40	**3.57**	
500	39.68		19.84		11.90		5.95	80	3.97	
600	47.62		23.81		14.29		7.14		4.76	
700	55.56		27.78		16.67		8.33		5.56	
800	63.49	200	31.75	150	19.05	125	9.52		6.35	80
900	**71.43**		**35.71**		**21.43**		**10.71**	100	**7.14**	
1000	79.37		39.68		23.81		11.90		7.94	
1200	95.24		47.62		28.57		14.29		9.52	
1300	103.17	250	51.59	200	30.95	150	15.48		10.32	100
1400	111.11		55.56		33.33		16.67	125	11.11	
1500	**119.05**		**59.52**		**35.71**		**17.86**		**11.90**	

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General notes

(1) Numbers are rounded. **(2)** All pipes sized with pressure drop <300Pa/m.

Fan coil system notes

(3) Fan coil unit cooling power in this case has been selected for a requirement of 100 W/m² of floor area and includes latent and sensible cooling.

(4) Chiller power for fan coil system includes AHU cooling coil power from ambient 28°C @ 60%RH to 18°C. Flow water temp to fan coils 6°C.

Chilled beam system notes

- **Dry air coolers should always be used with chilled beams systems.**
- A plate-heat-exchanger should be used to separate primary CHW with glycol from the secondary cooling water to beams i.e. there should be no glycol in the beams.

(5) Chilled beam cooling power in this case has been selected for a requirement of 70 W/m² of floor area, sensible cooling only, all dehumidification of primary air is done in the AHU. Cooling power of 300W/m² can be provided with a chilled beams system if necessary.

(6) Chilled beam heating power in this case has been selected for a requirement of 50 W/m² of floor area. LPHW flow temp 40°C. Heating power of >100W/m2 can be provided with beams systems if necessary.

(7) The chiller power for chilled beams system includes dehum of fresh air. Flow water temp from chiller is 13°C. Ambient 28°C 60% RH. Flow water temp to beams 16°C. Note high chiller efficiency.

(8) This is the pipe size for the total flow rate from the chiller. Some water will be going to the AHU cooling coil and some a plate-heat-exchanger serving the chilled beams. There will be no glycol on the room side of the PHE (i.e. there will be no glycol in the beams).

Note: Chilled beam systems have a much better annual efficiency than fan coil systems. This efficiency is not reflected in the above tables which show the cooling power required for the design day only.

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Displacement system notes

(9) Area served and cooling power of the displacement ventilation system is calculated based on a room temp of 24°C, supply air temp of 18°C, with the room height 4m. Stratification of ~1K/m. Cooling of 70W/m² for the occupied zone.

(10) Chiller power and cooling coil power in the AHU, for displacement systems, assuming 100% fresh air at 28°C / 60%RH cooled down to 18°C with CHW flow temp 15°C. Note the chiller efficiency has increased due to the high cooling water temperature.