

HCV – Acoustic Selection Procedure

Where a pre-determined room noise level is to be met, the following procedure is suggested. These examples ignore fan and air outlet generated noise, which would be established and allowed for in practice.

Example 1: Lined Duct, No Attenuator

A circular inlet series HCV assembly supplies three offices with a total of 0.614 m³/s at 250 Pa ΔPs. The most critical of these is supplied with air from two 200 mm I.D. ducts, each 3 metres long, internally lined with acoustic material, terminating with a 200 mm neck diameter ceiling diffuser. Each handles 0.123 m³/s. Select a suitable assembly size and model for a room level of NC 30.

ITEM	Octave Band & Centre Frequency, Hz					
	2	3	4	5	6	7
	125	250	500	1000	2000	4000
1. Room sound pressure level at NC 30 (Table 1)	-48	-42	-35	-31	-30	-28
2. Room attenuation (by calculation)	-10	-10	-10	-10	-10	-10
3. Duct attenuation (Table 2 interpolation)	-4	-9	-17	-22	-22	-18
4. Flow division (Table 3)	-7	-7	-7	-7	-7	-7
5. End reflection (Table 4)	-10	-6	-2	0	0	0
6. Total attenuation including room Lp	-79	-74	-71	-70	-69	-63
7. Allowance for number of outlets (Table 5)	+3	+3	+3	+3	+3	+3
8. Nett attenuation including room Lp	-76	-71	-68	-67	-66	-60
9. Select model HCV-X200C2, size 300 with Lw = (Page 268G)	67	65	64	61	60	60

Example 2: With Attenuator and Lined Duct Alternative

A circular inlet series HCV assembly supplies a conference room with a total of 0.142 m³/s at 250 Pa ΔPs. It discharges directly into the room through a short rectangular duct and a high sidewall diffuser. Select a suitable assembly size and model for an approximate room level of NC 25. As an alternative, what size and model could be selected if the assembly supplied the room through a 200 I.D. insulated duct, 3 metres long.

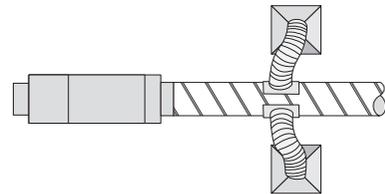
The above data is shown graphically on the following pages. The curves shown are in accordance with data presented in the ASHRAE Fundamentals Handbook, 2005.

ITEM	Octave Band & Centre Frequency, Hz					
	2	3	4	5	6	7
	125	250	500	1000	2000	4000
1. Room sound pressure level at NC 25 (Table 1)	-45	-38	-31	-27	-24	-22
2. Room attenuation (by calculation)	-10	-10	-10	-10	-10	-10
3. End reflection (Table 4)	-11	-7	-3	-1	0	0
4. Total attenuation including room Lp	-66	-55	-44	-38	-34	-32
5. Select model HCV-X201C0, Size 150 with Lw = (Page 269G) If room is supplied through insulated duct:	60	52	37	26	20	20
6. Duct attenuation	-4	-9	-17	-22	-22	-18
7. End reflection	-10	-6	-2	0	0	0
8. Total attenuation including room Lp	-69	-63	-60	-59	-56	-50
9. Select model HCV-X200C1, size 150 with Lw = (Page 268G)	62	63	58	56	53	54

NC Index	Octave Band & Centre Frequency, Hz					
	2	3	4	5	6	7
	125	250	500	1000	2000	4000
15	36	29	22	17	14	12
20	40	33	26	22	20	17
25	45	38	31	27	24	22
30	48	42	35	31	30	28
35	53	46	40	36	34	33
40	57	51	45	41	39	38
45	60	54	49	46	44	43
50	64	59	54	51	49	48
55	67	63	58	56	54	53
60	71	67	63	61	59	58

Duct Dia. mm	Octave Band & Centre Frequency, Hz					
	2	3	4	5	6	7
	125	250	500	1000	2000	4000
150	1.64	3.28	5.91	7.22	7.22	6.56
300	0.98	2.30	4.92	7.22	7.22	4.92
600	0.66	1.64	3.28	5.58	2.95	1.64
1200	0.33	0.98	1.97	1.97	1.64	1.64

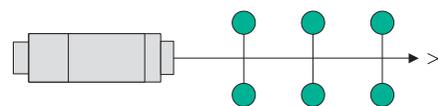
(Data based on 0.45 to 0.75 mm Spiroloc with 25 mm fibreglass and perforated steel liner. Test duct was 7 m long, no air flow.)



% Total Flow	5	10	15	20	30	40	50	80
dB Attenuation	13	10	8	7	5	4	3	1

% Total Flow = (m³/s for one diffuser) / (m³/s total for assembly) x 100.

Duct Dia. mm	Octave Band & Centre Frequency, Hz					
	2	3	4	5	6	7
	125	250	500	1000	2000	4000
125	12	8	4	1	0	0
250	8	4	1	0	0	0
500	4	1	0	0	0	0
1000	1	0	0	0	0	0



No. of Outlets	1	2	3	4	8	10	20	40
dB Increase	0	3	5	6	9	10	13	16

Refer to page 13A of Engineering Data 'Noise Criteria', for corrections for room conditions.

The curves below are based on data published in the ASHRAE Fundamentals Handbook 2005 and will be useful for noise criteria calculations. Superimposed are the plots derived from Example 1 worked on the previous page.

