

RAPID SYSTEM ANALYSIS EXAMPLE

Rapid Acoustic Design

Job: Sample
Fan: AP0804CA9/21

System: Car Park Exhaust
Date: 26/03/03

Duty: 6m³/s @ 350Pa
Location: CPEF

		Octave Band Centre Frequency (Hz)								
		Ref.	63	125	250	500	1k	2k	4k	8k
Enter in-duct sound power level, (L _W) of fan <i>Ref. a.</i>	L _W entering system (fan L _W)	a.	91	88	89	87	87	83	79	73
Enter losses due to transmission through duct system <i>Ref. b. to f.</i>	rect. duct 1200 x 1000 x 4m (Fig. 3)	b.	-2	-1	-1	0	0	0	0	0
	rect. duct 800 x 600 x 4m (Fig. 3)	b.	-2	-2	-1	-1	-1	-1	-1	-1
	800 x 600 radius bend	c.	0	0	0	0	0	0	0	0
	800 x 600 bend w/o turning vanes (Fig. 4)	c.	0	-2	-5	-5	-3	-3	-3	-3
	1200 x 1000 lined duct, 25mm insulation x 1m	d.	-1	-1	-1	-4	-6	-5	-5	-5
	Largest transition dimension used (Table 1)									
	tolerance (see note on page H-32)	e.	+3	+3	+3	+3	+3	+3	+3	+3
	outlet area (Fig. 5) 0.28m ²	f.	-9	-5	-2	0	0	0	0	0
Enter sound power level, L _W , leaving system <i>Ref. a. + (b. to f.) = g.</i>	L _W leaving system	g.	80	80	82	80	80	77	73	67
Enter direct sound pressure, L _p , room corrections <i>Ref. h. to j.</i>	direct L _p sound to grille (Fig. 6) 15%	h.	-8	-8	-8	-8	-8	-8	-8	-8
	distance to listener (Fig. 7) 3m	i.	-21	-21	-21	-21	-21	-21	-21	-21
	directivity area (Fig. 10) >0.1 & <1m ² grille position - at edge of 2 surfaces	j.	+8	+9	+9	+9	+9	+9	+9	+9
Enter direct sound pressure, L _p , in room <i>Ref. g. + (h. to j.) = k.</i>	direct L _p in room	k.	59	60	62	60	60	57	53	47
Enter reverberant sound pressure, L _p , room corrections <i>Ref. l. to m.</i>	reverberant L _p sound to room (Fig. 11) 50%	l.	-3	-3	-3	-3	-3	-3	-3	-3
	room type (Fig. 12-16) live room	m.	-3	-3	-3	-6	-7	-8	-11	-13
	room volume 2000m ³									
Enter reverberant sound pressure, L _p , room corrections <i>Ref. g. + (l. to m.) = n.</i>	reverberant L _p in room	n.	74	74	76	71	70	66	59	51
Calculate difference in L _p , between k and m. Add correction from Fig. 17 to higher L _p	combined L _p in room (Fig. 17)	o.	74	74	76	71	70	67	60	52
Enter total L _p all systems in room <i>Ref. p.</i>	total all systems in room	p.	74	74	76	71	70	67	60	52
Enter required NR level <i>Ref. q</i>	design criteria (page H-27 or H-37) NR50	q.	75	66	59	53	50	47	45	43
Enter required performance of attenuator <i>Ref. p. - q = r.</i>	attenuation required	r.	-1	8	17	18	20	20	15	9
Enter attenuator selection <i>Ref. s.</i>	attenuator selection RT20E-120-100	s.	4	11	23	34	38	26	16	10
Enter resultant L _p in room <i>Ref. p. - s. = t</i>	resultant L _p in room	t.	70	63	53	37	32	41	44	42
Compare resultant L _p in room <i>Ref. t.</i> to NR curve and enter achieved criteria <i>Ref. u.</i>	criteria achieved (page H-37) NR50	u.	75	65	58	53	50	47	45	44

Example

Airflow required = 6000 l/sec
 Estimated static pressure = 300 Pa
 Fan selected = AP0804CA9/21
 Attenuator selection
 - Page H-11 Model RT20E-120-100
 Pressure drop from graph
 - Page H-10 18 Pa
 Re-check selection for new duty of 6000 l/sec @ 318 Pa - selection OK.

