

## MODELS ECO-10 • ECO-20 • UCO-10 • UCO-20

SINGLE & DOUBLE DEFLECTION SUPPLY REGISTERS

3/4" SPACING

Supply Grilles and Registers

A

Grille Size		Minimum Duct Diameter Required	Grille Core Area ft <sup>2</sup>	Vel Press, Pv	.01	.01	.02	.02	.03	.04	.05	.06																	
Nom Width W	Nom Height H			Core Velocity	300	400	500	600	700	800	900	1000																	
12	3	5" ∅	.18	CFM	50	70	90	110	130	150	160	180																	
				NC	<20	<20	<20	<20	21	25	28	31																	
				Throw	0°	4	5	10	5	7	12	6	9	13	7	11	15	8	11	16	10	12	17	10	13	18	11	13	19
					22.5°	3	4	7	4	5	9	5	7	10	5	8	11	6	8	12	7	9	12	7	9	13	8	10	14
45°	2	3	5		3	4	7	3	5	7	4	6	8	5	6	9	5	7	9	5	7	10	6	7	10				
12	4	6" ∅	.26	CFM	80	100	130	160	180	210	230	260																	
				NC	<20	<20	<20	<20	23	26	30	33																	
				Throw	0°	4	6	13	6	8	14	7	11	16	9	13	18	10	13	19	12	14	20	12	15	21	13	16	22
					22.5°	3	5	9	4	6	10	5	8	12	7	9	13	7	10	14	9	10	15	9	11	15	9	12	16
45°	2	3	7		3	5	8	4	6	9	5	7	10	5	7	10	7	8	11	7	8	12	7	9	12				
18	3	5" ∅	.28	CFM	80	110	140	170	190	220	250	280																	
				NC	<20	<20	<20	<20	23	27	30	33																	
				Throw	0°	4	6	13	6	9	15	8	11	16	9	13	18	11	13	19	12	15	20	13	15	22	13	16	23
					22.5°	3	5	9	4	7	11	6	8	12	7	9	13	8	10	14	9	11	15	9	11	16	10	12	17
45°	2	3	7		3	5	8	4	6	9	5	7	10	6	7	10	7	8	11	7	8	12	7	9	13				
10	6	8" ∅	.34	CFM	100	140	170	210	240	270	310	340																	
				NC	<20	<20	<20	<20	24	28	31	34																	
				Throw	0°	5	7	14	7	10	16	8	13	18	10	14	20	11	15	22	13	16	23	14	18	25	15	18	26
					22.5°	4	5	10	5	7	12	6	9	13	7	10	15	8	11	16	10	12	17	10	13	18	11	13	19
45°	3	4	8		4	5	9	5	7	10	5	8	11	6	8	12	7	9	13	8	10	13	8	10	14				
24	3	5" ∅	.37	CFM	110	150	190	220	260	300	340	370																	
				NC	<20	<20	<20	20	24	28	31	34																	
				Throw	0°	5	8	15	7	11	17	9	13	19	10	15	20	12	16	22	14	17	24	15	18	26	15	19	27
					22.5°	4	6	11	5	8	12	7	10	14	7	11	15	9	12	16	10	12	17	11	13	19	11	14	19
45°	3	4	8		4	6	9	5	7	10	5	8	11	7	9	12	8	9	13	8	10	14	8	10	15				
18	4	6" ∅	.40	CFM	120	160	200	240	280	320	360	400																	
				NC	<20	<20	<20	20	24	28	32	35																	
				Throw	0°	6	8	15	7	11	18	9	13	20	11	15	22	13	16	23	14	18	25	15	19	27	16	20	28
					22.5°	4	6	11	5	8	13	7	10	14	8	11	16	9	12	17	10	13	18	11	14	19	12	14	20
45°	3	4	8		4	6	10	5	7	11	6	8	12	7	9	13	8	10	13	8	10	15	9	11	15				
10	8	12" ∅	.47	CFM	140	190	240	280	330	380	430	470																	
				NC	<20	<20	<20	21	25	29	32	35																	
				Throw	0°	6	8	16	8	12	19	10	15	22	11	16	23	13	18	25	15	19	27	17	20	29	18	21	30
					22.5°	4	6	12	6	9	14	7	11	16	8	12	17	10	13	18	11	14	20	12	15	21	13	15	22
45°	3	5	9		4	7	10	5	8	12	6	9	13	7	10	14	8	10	14	8	10	15	9	11	16	10			
14	6	8" ∅	.49	CFM	150	200	250	290	340	390	440	490																	
				NC	<20	<20	<20	21	25	29	33	36																	
				Throw	0°	6	9	17	8	12	20	10	15	22	12	17	24	14	18	26	15	20	27	17	20	29	18	22	31
					22.5°	5	7	12	6	9	14	7	11	16	9	12	17	10	13	19	11	14	20	12	15	21	13	16	22
45°	3	5	9		4	7	11	5	8	12	7	9	13	8	10	14	8	11	15	9	11	16	10	12	17				
24	4	6" ∅	.54	CFM	160	210	270	320	380	430	480	540																	
				NC	<20	<20	<20	21	26	29	33	36																	
				Throw	0°	6	9	18	8	12	20	11	15	23	13	18	25	15	19	27	17	20	29	18	22	30	19	23	32
					22.5°	5	7	13	6	9	15	8	11	17	9	13	18	11	14	20	12	15	21	13	16	22	14	17	23
45°	3	5	10		5	7	11	6	8	13	7	10	13	8	10	15	9	11	16	10	12	17	10	13	18				
36	3	5" ∅	.57	CFM	170	230	280	340	400	450	510	570																	
				NC	<20	<20	<20	21	26	29	33	36																	
				Throw	0°	6	10	18	8	13	21	11	15	23	13	18	26	15	20	28	17	21	29	18	22	32	19	23	33
					22.5°	5	7	13	6	9	15	8	11	17	9	13	19	11	14	20	12	15	21	13	16	23	14	17	24
45°	3	5	10		5	7	12	6	8	13	7	10	14	8	11	15	9	12	16	10	12	17	10	13	18				
18	6	8" ∅	.64	CFM	190	260	320	380	450	510	570	640																	
				NC	<20	<20	<20	22	26	30	34	37																	
				Throw	0°	7	10	19	9	14	22	11	17	25	13	19	27	16	21	29	18	22	32	19	23	33	20	25	35
					22.5°	5	7	14	7	10	16	8	12	18	10	14	20	12	15	21	13	16	23	14	17	24	15	18	25
45°	4	5	10		5	8	12	6	9	13	7	10	15	9	12	16	10	12	17	10	13	18	11	13	19				

SEE PAGE A-19 FOR PERFORMANCE DATA NOTES



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A

Grille Size		Minimum Duct Diameter Required	Grille Core Area ft <sup>2</sup>	Vel Press, Pv	.01					.02					.03					.04					.05					.06														
Nom Width W	Nom Height H			Core Velocity	300					400					500					600					700					800					900					1000				
				Ps	0°																																							
					22.5°																																							
					45°																																							
14	8	12" ∅	.68	CFM	200					270					340					410					470					540					610					680				
				NC	<20					<20					<20					22					27					31					34					37				
				Throw	0°																																							
					22.5°																																							
12	10	14" ∅	.73	CFM	220					290					370					440					510					590					660					730				
				NC	<20					<20					<20					23					27					31					34					37				
				Throw	0°																																							
					22.5°																																							
36	4	6" ∅	.81	CFM	240					320					410					490					570					650					730					810				
				NC	<20					<20					<20					23					27					31					35					38				
				Throw	0°																																							
					22.5°																																							
24	6	8" ∅	.86	CFM	260					340					430					520					600					690					770					860				
				NC	<20					<20					<20					23					28					32					35					38				
				Throw	0°																																							
					22.5°																																							
18	8	12" ∅	.88	CFM	260					350					440					530					620					700					790					880				
				NC	<20					<20					<20					23					28					32					35					38				
				Throw	0°																																							
					22.5°																																							
12	12	18" ∅	.89	CFM	270					360					440					530					620					710					800					890				
				NC	<20					<20					<20					23					28					32					35					38				
				Throw	0°																																							
					22.5°																																							
18	10	14" ∅	1.12	CFM	340					450					560					670					780					900					1010					1120				
				NC	<20					<20					<20					24					29					33					36					39				
				Throw	0°																																							
					22.5°																																							
24	8	12" ∅	1.18	CFM	360					470					590					710					830					950					1070					1180				
				NC	<20					<20					<20					25					29					33					36					39				
				Throw	0°																																							
					22.5°																																							
36	6	8" ∅	1.30	CFM	390					520					650					780					910					1040					1170					1300				
				NC	<20					<20					<20					25					29					33					37					40				
				Throw	0°																																							
					22.5°																																							
18	12	18" ∅	1.36	CFM	410					540					680					820					950					1090					1220					1360				
				NC	<20					<20					20					25					30					34					37					40				
				Throw	0°																																							
					22.5°																																							
24	10	14" ∅	1.51	CFM	450					600					750					900					1060					1210					1360					1510				
				NC	<20					<20					20					26					30					34					37					40				
				Throw	0°																																							
					22.5°																																							

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Grille Size		Minimum Duct Diameter Required	Grille Core Area ft <sup>2</sup>	Vel Press, Pv	.01	.01	.02	.02	.03	.04	.05	.06																
Nom Width W	Nom Height H			Core Velocity	300	400	500	600	700	800	900	1000																
P <sub>s</sub>	Throw		0°	.02		.03		.05		.07		.09		.12		.15		.19		.24		.30						
	22.5°		22.5°	.02		.04		.06		.09		.12		.15		.19		.24		.30		.36						
	45°		45°	.03		.05		.07		.11		.15		.19		.24		.30		.36		.45						
36	18	26" ∅	4.25	CFM	1270		1700		2120		2550		2970		3400		3820		4250									
				NC	<20		<20		25		30		35		38		42		45									
				Throw	0°	18	26	50	23	35	57	29	43	64	35	50	70	41	53	76	46	57	81	50	61	85	53	64
24	12	18" ∅	1.83	CFM	550		730		920		1100		1280		1470		1650		1830									
				NC	<20		<20		21		27		31		35		38		41									
				Throw	0°	11	18	32	15	23	37	19	29	42	23	32	46	27	35	50	31	38	53	32	40	56	34	42
36	10	14" ∅	2.28	CFM	690		910		1140		1370		1600		1830		2060		2280									
				NC	<20		<20		22		27		32		36		39		42									
				Throw	0°	13	20	36	17	25	42	21	32	47	26	36	51	30	39	55	34	42	60	36	45	63	39	47
36	12	18" ∅	2.77	CFM	830		1110		1390		1660		1940		2220		2500		2770									
				NC	<20		<20		23		28		33		37		40		43									
				Throw	0°	14	21	40	19	28	46	24	35	52	28	40	57	33	43	61	38	46	65	40	49	69	42	52
12	14	20" ∅	1.05	CFM	310		420		520		630		730		840		940		1050									
				NC	<20		<20		<20		24		29		32		36		39									
				Throw	0°	8	13	25	12	18	29	14	22	32	18	25	35	20	27	37	23	29	40	25	30	43	26	32
18	14	20" ∅	1.60	CFM	480		640		800		960		1120		1280		1440		1600									
				NC	<20		<20		21		26		30		34		38		41									
				Throw	0°	11	16	30	14	22	35	18	27	39	22	30	43	25	33	46	29	35	50	30	37	53	32	39
24	14	20" ∅	2.16	CFM	650		860		1080		1290		1510		1720		1940		2160									
				NC	<20		<20		22		27		32		36		39		42									
				Throw	0°	13	19	35	17	25	41	21	31	46	25	35	50	29	38	54	33	41	57	35	43	61	37	46
30	14	20" ∅	2.71	CFM	810		1080		1350		1630		1900		2170		2440		2710									
				NC	<20		<20		23		28		33		37		40		43									
				Throw	0°	14	21	39	18	28	46	23	35	51	28	40	56	33	43	60	37	46	64	39	48	69	42	51
36	14	20" ∅	3.26	CFM	980		1310		1630		1960		2290		2610		2940		3260									
				NC	<20		<20		24		29		33		37		41		44									
				Throw	0°	15	23	43	20	31	50	25	39	56	31	43	62	36	47	67	41	50	71	43	53	75	46	56
42	14	20" ∅	3.82	CFM	1150		1530		1910		2290		2670		3060		3440		3820									
				NC	<20		<20		24		30		34		38		41		44									
				Throw	0°	17	25	47	22	33	54	27	41	61	33	47	67	39	50	71	44	54	77	47	57	81	50	61
48	14	20" ∅	4.37	CFM	1310		1750		2190		2620		3060		3500		3940		4370									
				NC	<20		<20		25		30		35		39		42		45									
				Throw	0°	18	27	50	24	36	58	29	44	65	35	50	71	41	54	77	47	58	82	50	62	87	53	65

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Grille Size		Minimum Duct Diameter Required	Grille Core Area ft <sup>2</sup>	Vel Press, Pv	.01	.01	.02	.02	.03	.04	.05	.06																	
Nom Width W	Nom Height H			Core Velocity	300	400	500	600	700	800	900	1000																	
18	16	24" ∅	1.84	Ps	0°	.02	.03	.05	.07	.09	.12	.15																	
				22.5°	.02	.04	.06	.09	.12	.15	.19	.24	.30																
				45°	.03	.05	.07	.11	.15	.19	.24	.30	.36	.42															
				CFM	550	740	920	1100	1290	1470	1660	1840																	
				NC	<20	<20	21	27	31	35	38	41																	
24	16	24" ∅	2.48	Throw	0°	11	18	32	15	23	38	19	29	42	23	32	46	27	35	50	31	38	53	33	40	57	34	42	60
				22.5°	8	13	23	11	17	27	14	21	30	17	23	33	19	25	36	22	27	38	24	29	41	25	30	43	
				45°	6	10	18	8	13	21	10	16	23	13	18	25	15	19	27	17	21	29	18	22	31	19	23	33	
				CFM	740	990	1240	1490	1740	1980	2230	2480																	
				NC	<20	<20	23	28	32	36	40	43																	
30	16	24" ∅	3.12	Throw	0°	13	20	38	18	27	43	22	34	49	27	38	53	32	41	58	36	43	62	38	46	65	40	49	69
				22.5°	10	14	27	13	19	31	16	24	35	19	27	38	23	29	42	26	31	44	27	33	47	29	35	50	
				45°	7	11	21	10	15	24	12	18	27	15	21	29	17	22	32	20	24	34	21	25	36	22	27	38	
				CFM	940	1250	1560	1870	2180	2490	2810	3120																	
				NC	<20	<20	24	29	33	37	41	44																	
36	16	24" ∅	3.75	Throw	0°	16	25	47	22	33	54	27	41	60	33	46	66	39	50	71	43	54	76	46	57	81	49	60	85
				22.5°	12	18	34	16	24	39	20	30	43	24	33	47	28	36	51	31	39	54	33	41	58	35	43	61	
				45°	9	13	26	12	18	30	15	23	33	18	25	36	21	28	39	24	30	42	25	31	44	27	33	47	
				CFM	1130	1500	1880	2250	2630	3000	3380	3750																	
				NC	<20	<20	24	30	34	38	41	44																	
42	16	24" ∅	4.39	Throw	0°	18	27	50	24	36	58	29	44	65	36	50	71	41	55	77	47	58	82	50	62	87	53	65	92
				22.5°	13	19	36	17	26	42	21	32	47	26	36	51	30	39	55	34	42	59	36	44	62	38	47	66	
				45°	10	15	28	13	20	32	16	24	36	20	28	39	23	30	42	26	32	45	28	34	48	29	36	50	
				CFM	1320	1760	2200	2640	3070	3510	3950	4390																	
				NC	<20	<20	25	26	30	35	39	42	45																
48	16	24" ∅	5.03	Throw	0°	19	29	54	25	38	62	32	48	69	38	54	76	44	58	82	50	62	88	54	66	93	57	69	98
				22.5°	14	21	39	18	27	45	23	34	50	27	39	55	32	42	59	36	45	64	39	47	67	41	50	71	
				45°	10	16	30	14	21	34	17	26	38	21	30	42	24	32	45	28	34	49	30	36	51	31	38	54	
				CFM	1510	2010	2520	3020	3520	4020	4530	5030																	
				NC	<20	<20	26	31	35	39	43	46																	

### Test Standard

- ANSI / ASHRAE Std 70

### Sound Levels

- NC (Noise Criteria) shown is for 0° blade angle setting, no diverter / scoop damper, and is the noise criteria curve that will not be exceeded at the operating point. This is determined by assuming a 10 dB (ref: 10<sup>-12</sup> watts) room attenuation that is subtracted from the sound power levels in each of the 2nd thru 7th octave bands.
- For 22-1/2° blade angle, add + 2NC
- For 45° blade angle, add +6 NC
- Optional Diverting / Scoop damper, add +4 NC

### Throw Distance

- The numbers shown are throw distances, in feet, measured along the jet trajectory axis relating to terminal velocities of 150, 100, & 50 fpm.
- Terminal velocity is the air speed, in feet per minute, measured in the supply air stream.
- For exposed duct applications, above data assumes a free, unattached jet (no surface effect).

### Pressure

- Pv is the air velocity pressure for the grille size and CFM shown.
- Ps is Static Pressure
- Pt is Total Pressure and can be calculated as Pt = Ps + Pv
- All pressures are stated and calculated in inches of water

### Calculating other Sizes

- Core Area = (Width - 11/16") x (Height - 11/16") / 144
- Find grille in table with similar core area and read across to find the Air Flow rate (CFM) desired.



## GENERAL

Total pressure in a duct consists of static pressure ( $P_s$ ) and velocity pressure ( $P_v$ ) components. With a hole (grille) in the sidewall of a duct, it is the static pressure component that pushes the air out through the hole perpendicularly, while the velocity pressure component imparts an angular discharge:

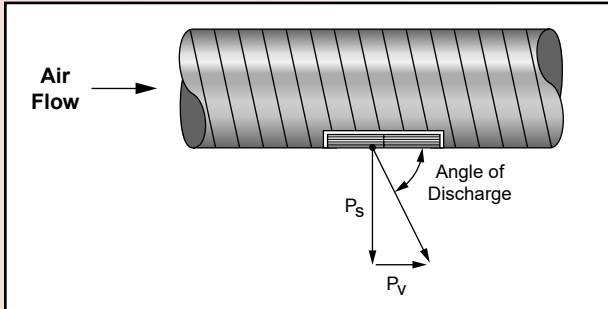


Figure A: High Static - Low Velocity

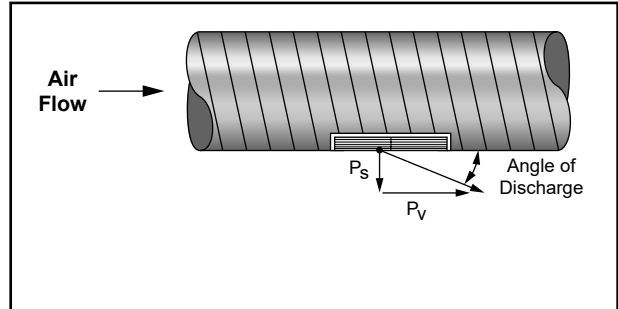


Figure B: Low Static - High Velocity

When comparing the extreme cases of high static - low velocity pressure (fig A.) vs. low static - high velocity pressure (fig B.) for analysis purposes, it becomes clear that the high static / low velocity pressure condition is preferred for the following reasons:

1. The system can be designed such that diverting dampers / extractors for turning the air can be eliminated. These devices create noise and add cost.
2. The system will be nearly self-balancing with grilles requiring equal pressure.
3. Double deflection supply grilles with rear vertical blades will effectively redirect or straighten the air stream with minimal acoustical impact. Often, one or more rear louvers can be closed to "tweak" the air quantity.

## DUCT DESIGN RECOMMENDATIONS

1. Design with a duct velocity of less than 1000 fpm, keeping the diameter as large as practical.
2. Do not step the duct diameter down. Maintain a constant diameter to keep the velocity pressure low and regain the static pressure.
3. Refer to Fig C & Table 1 for guidance on minimizing grille total pressure loss. Design to stay within shaded area in Table 1.
4. With small duct diameters, staggering grilles rather than installing back to back will reduce the pressure drop for that duct run.

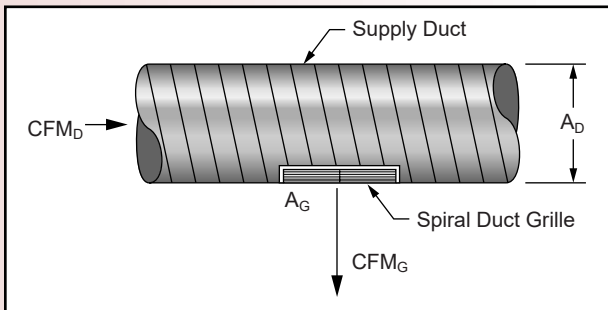


Figure C

$A_G / A_D$	ECO/UCO Grille Loss Coefficients (smaller is better)									
	$CFM_G / CFM_D$									
	.10	.20	.30	.40	.50	.60	.70	.80	.90	1.00
.10	1.9	1.1	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.8
.20	5.0	1.9	1.3	1.1	1.0	1.0	1.0	0.9	0.9	0.9
.30	10.4	3.2	1.9	1.4	1.2	1.1	1.1	1.0	1.0	1.0
.40	17.8	5.0	2.7	1.9	1.5	1.3	1.2	1.1	1.1	1.0
.50	-	7.4	3.8	2.5	1.9	1.6	1.4	1.3	1.2	1.1
.60	-	10.4	5.0	3.2	2.4	1.9	1.6	1.4	1.3	1.2
.70	-	13.8	6.6	4.1	2.9	2.3	1.9	1.7	1.5	1.4
.80	-	17.8	8.3	5.0	3.5	2.7	2.2	1.9	1.7	1.6
.90	-	-	10.4	6.2	4.2	3.2	2.6	2.2	1.9	1.7
1.00	-	-	13.0	7.6	5.1	3.9	3.0	2.5	2.1	1.8

Table 1