

SOUND ATTENUATOR SQUARE-RECTANGLE CSA



APPLICATION

CSA, dissipative SOUND ATTENUATOR (SILENCER), is designed to provide solutions to all HVAC discharge noise with high dynamic insertion loss.

FEATURED STANDARD CONSTRUCTION

- **FRAME:**
 - Constructed from 20 gauge galvanized frame, formed with lock seams with mastic sealant.
 - The top and bottom of the casing covered with fiber clean liner 1”(25mm) thick protected by 22 gauge perforated metal sheet.
- **SPLITTERS:**
 - Constructed from 22 gauge galvanized frame.
 - 8”(200mm) wide radiussed at one end to minimize air pressure loss and regenerated noise.
 - Filled with acoustic fibers complying with various standards requirements. The infill is compressed and contained behind a 22 gauge, 4mm hole diameter perforated metal sheet. This protection prevents damage and fiber erosion up to 5900fpm (30m/s).
 - Clean liner glass fiber as last layer.
- **AIR WIDTH:**
 - Varies between 3”(75mm), 4”(100mm), 6”(150mm) & 8”(200mm) depending on required insertion loss and pressure drops.
- **SIZES:**
 - Minimum size of 11”(275mm)W x 8”(200mm)H
 - Rectangular silencers with weight that exceed 200Kg (441Lbs) are manufactured as multiple section and field assembled (By others).

OPTIONS

- 18Ga or 16Ga casing & splitters frame.
- Aluminum Construction
- Stainless Steel Construction
- Standard galvanized Duct-mate flange 1-3/8” (35mm) with finished corners for Galvanized Construction.
- Standard Stainless Steel normal duct flange 1-3/8” (35mm) with finished corners. for Stainless Construction.

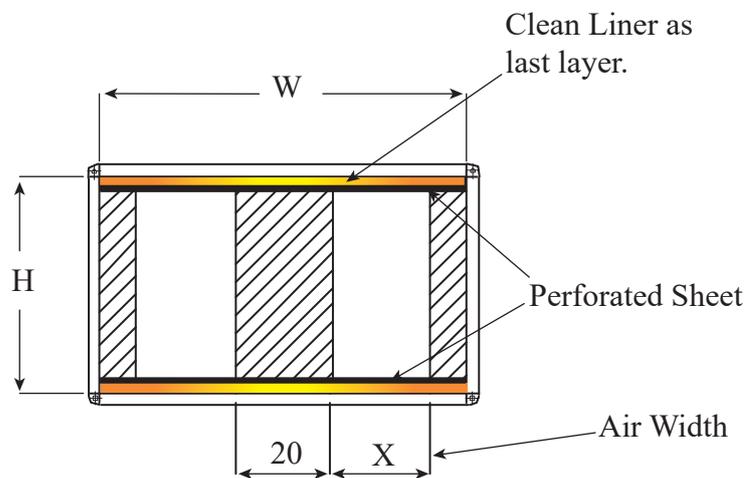
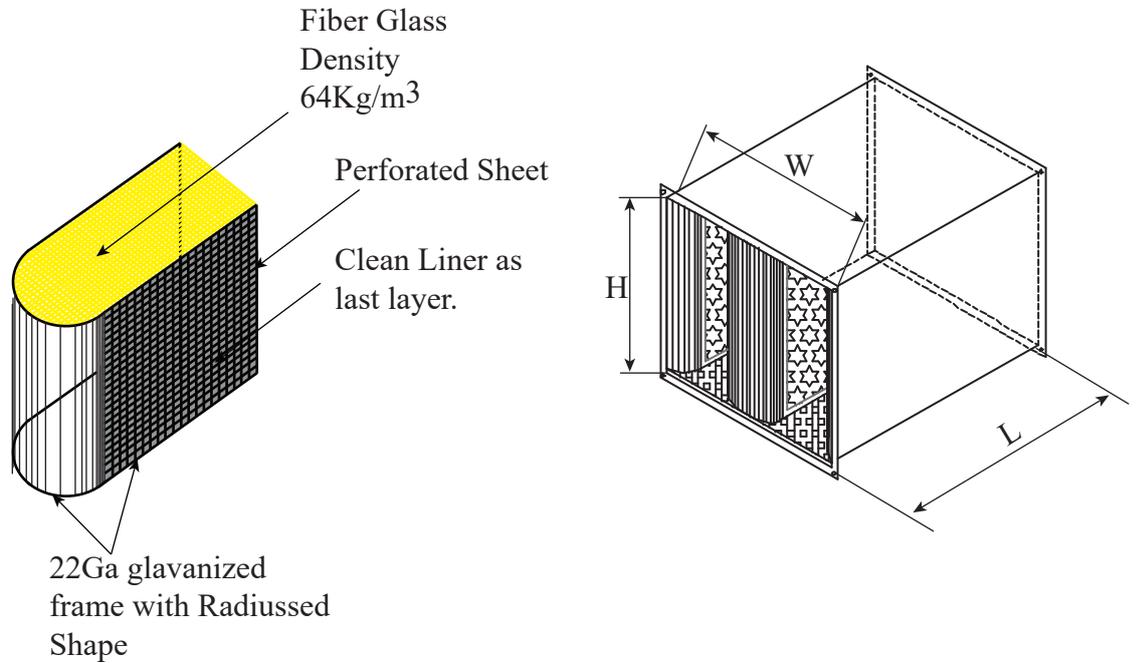
ACOUSTICAL PERFORMANCE TESTING
WAS PERFORMED BY:
ETL-INTERTEK-USA
ACCORDANCE TO ASTM E-477



TESTED AT 400°C FOR 2 HOURS
TEST WAS PERFORMED BY:
APPLUS+ LABORATORIES



ILLUSTRATIONS



ACOUSTICAL PERFORMANCE TESTING
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TESTED AT 400°C FOR 2 HOURS
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SOUND ATTENUATOR

SQUARE-RECTANGLE

CSA-20-10-L

Air Flow Performance (BS)

SILENCER LENGTH			STATIC PRESSURE LOSS IN INCH Wg.							
LENGTH 96"			0.061	0.130	0.281	0.500	0.781	1.125	1.530	2.000
LENGTH 84"			0.058	0.118	0.264	0.470	0.734	1.058	1.439	1.880
LENGTH 72"			0.054	0.120	0.251	0.447	0.698	1.006	1.369	1.788
LENGTH 60"			0.051	0.110	0.236	0.420	0.656	0.950	1.286	1.680
LENGTH 48"			0.045	0.095	0.205	0.365	0.570	0.825	1.115	1.460
LENGTH 36"			0.038	0.080	0.174	0.310	0.484	0.700	0.950	1.240
LENGTH 24"			0.028	0.070	0.152	0.270	0.422	0.610	0.850	1.080
FACE VELOCITY (fpm)			350	500	750	1000	1250	1500	1750	2000
WIDTH (inch)	HEIGHT (inch)	FACE AREA (Ft ²)	AIRFLOW (Cfm)							
12	12	1	350	500	750	1000	1250	1500	1750	2000
24	12	2	700	1000	1500	2000	2500	3000	3500	4000
24	18	3	1050	1500	2250	3000	3750	4500	5250	6000
24	21	3.5	1225	1750	2625	3500	4375	5250	6125	7000
24	24	4	1400	2000	3000	4000	5000	6000	7000	8000
36	12	3	1050	1500	2250	3000	3750	4500	5250	6000
36	18	4.5	1575	2250	3375	4500	5625	6750	7875	9000
36	20	5	1750	2500	3750	5000	6250	7500	8750	10000
36	24	6	2100	3000	4500	6000	7500	9000	10500	12000
36	28	7	2450	3500	5250	7000	8750	10500	12250	14000
36	32	8	2800	4000	6000	8000	10000	12000	14000	16000
36	36	9	3150	4500	6750	9000	11250	13500	15750	18000
48	12	4	1400	2000	3000	4000	5000	6000	7000	8000
48	18	6	2100	3000	4500	6000	7500	9000	10500	12000
48	24	8	2800	4000	6000	8000	10000	12000	14000	16000
48	30	10	3500	5000	7500	10000	12500	15000	17500	20000
48	36	12	4200	6000	9000	12000	15000	18000	21000	24000
48	42	14	4900	7000	10500	14000	17500	21000	24500	28000
48	48	16	5600	8000	12000	16000	20000	24000	28000	32000
60	18	7.5	2625	3750	5625	7500	9375	11250	13125	15000
60	24	10	3500	5000	7500	10000	12500	15000	17500	20000
60	30	12.5	4375	6250	9375	12500	15625	18750	21875	25000
60	36	15	5250	7500	11250	15000	18750	22500	26250	30000
60	42	17.5	6125	8750	13125	17500	21875	26250	30625	35000
60	48	20	7000	10000	15000	20000	25000	30000	35000	40000
60	54	22.5	7875	11250	16875	22500	28125	33750	39375	45000
60	60	25	8750	12500	18750	25000	31250	37500	43750	50000



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Air Flow Performance(SI)

SILENCER LENGTH (mm)			STATIC PRESSURE LOSS IN Pa.							
LENGTH 2400			15	33	70	125	195	281	383	500
LENGTH 2100			15	30	66	118	184	264	360	470
LENGTH 1800			14	30	63	112	175	252	342	447
LENGTH 1500			13	28	59	105	164	238	322	420
LENGTH 1200			11	24	51	91	142	206	279	365
LENGTH 900			10	20	44	78	121	174	237	310
LENGTH 600			7	18	38	68	106	153	212	270
FACE VELOCITY (m/s)			1.78	2.54	3.81	5.08	6.35	7.62	8.89	10.16
WIDTH (mm)	HEIGHT (mm)	FACE AREA (m ²)	AIRFLOW (m ³ /s)							
300	300	0.090	0.160	0.229	0.343	0.457	0.572	0.686	0.800	0.914
600	300	0.180	0.320	0.457	0.686	0.914	1.143	1.372	1.600	1.829
600	450	0.270	0.480	0.686	1.029	1.372	1.715	2.057	2.400	2.743
600	550	0.330	0.587	0.838	1.257	1.676	2.096	2.515	2.934	3.353
600	600	0.360	0.640	0.914	1.372	1.829	2.286	2.743	3.200	3.658
900	300	0.270	0.480	0.686	1.029	1.372	1.715	2.057	2.400	2.743
900	450	0.405	0.720	1.029	1.543	2.057	2.572	3.086	3.600	4.115
900	500	0.450	0.800	1.143	1.715	2.286	2.858	3.429	4.001	4.572
900	600	0.540	0.960	1.372	2.057	2.743	3.429	4.115	4.801	5.486
900	700	0.630	1.120	1.600	2.400	3.200	4.001	4.801	5.601	6.401
900	800	0.720	1.280	1.829	2.743	3.658	4.572	5.486	6.401	7.315
900	900	0.810	1.440	2.057	3.086	4.115	5.144	6.172	7.201	8.230
1200	300	0.360	0.640	0.914	1.372	1.829	2.286	2.743	3.200	3.658
1200	450	0.540	0.960	1.372	2.057	2.743	3.429	4.115	4.801	5.486
1200	600	0.720	1.280	1.829	2.743	3.658	4.572	5.486	6.401	7.315
1200	750	0.900	1.600	2.286	3.429	4.572	5.715	6.858	8.001	9.144
1200	900	1.080	1.920	2.743	4.115	5.486	6.858	8.230	9.601	10.973
1200	1050	1.260	2.240	3.200	4.801	6.401	8.001	9.601	11.201	12.802
1200	1200	1.440	2.560	3.658	5.486	7.315	9.144	10.973	12.802	14.630
1500	450	0.675	1.200	1.715	2.572	3.429	4.286	5.144	6.001	6.858
1500	600	0.900	1.600	2.286	3.429	4.572	5.715	6.858	8.001	9.144
1500	750	1.125	2.000	2.858	4.286	5.715	7.144	8.573	10.001	11.430
1500	900	1.350	2.400	3.429	5.144	6.858	8.573	10.287	12.002	13.716
1500	1050	1.575	2.800	4.001	6.001	8.001	10.001	12.002	14.002	16.002
1500	1200	1.800	3.200	4.572	6.858	9.144	11.430	13.716	16.002	18.288
1500	1350	2.025	3.600	5.144	7.715	10.287	12.859	15.431	18.002	20.574
1500	1500	2.250	4.001	5.715	8.573	11.430	14.288	17.145	20.003	22.860



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Acoustic Performance

SILENCER LENGTH Inch (mm)	FACE VELOCITY	STATIC PRESSURE DROP Inch.Wg (Pa)	OCTAVE BAND CENTER FREQ (Hz.)							
			63	125	250	500	1000	2000	4000	8000
			INSERTION LOSS (dB)							
LENGTH 96" (2400mm)	-1500	1.125 (281)	14	24	42	53	58	58	47	39
	-1000	0.5 (125)	14	22	42	53	58	58	49	41
	-750	0.281 (70)	13	22	41	53	58	58	50	43
	-500	0.13 (33)	13	22	41	52	58	57	50	43
	0	---	13	22	41	51	58	57	51	44
	500	0.13 (33)	13	21	40	51	58	56	52	45
	750	0.281 (70)	13	21	40	51	58	56	52	45
	1000	0.5 (125)	12	21	40	51	57	56	52	46
	1500	1.125 (281)	12	20	39	51	56	56	52	47
LENGTH 84" (2100mm)	-1500	1.058 (265)	11	20	37	50	57	57	51	29
	-1000	0.47 (118)	11	19	37	50	56	56	50	30
	-750	0.264 (66)	11	19	37	50	56	56	50	31
	-500	0.118 (30)	11	18	36	50	56	56	50	32
	0	---	12	18	36	49	55	55	50	32
	500	0.118 (30)	11	18	36	49	54	54	50	33
	750	0.264 (66)	11	18	36	49	54	54	50	33
	1000	0.47 (118)	10	18	35	48	53	53	50	34
	1500	1.058 (265)	10	17	34	47	53	53	51	36
LENGTH 72" (1800mm)	-1750	1.369 (342)	9	17	35	45	47	50	41	22
	-1500	1.006 (251)	9	16	34	45	48	50	44	25
	-1000	0.447 (112)	8	16	32	43	50	50	50	28
	-500	0.12 (30)	8	16	32	43	50	50	50	28
	0	---	8	15	31	42	50	50	49	28
	500	0.12 (30)	8	15	31	42	50	50	49	28
	1000	0.447 (112)	8	15	31	42	50	50	49	28
	1500	1.006 (251)	7	14	30	40	48	46	42	27
	1750	1.369 (342)	6	12	30	40	46	44	38	25
LENGTH 60" (1500mm)	-1750	1.28 (320)	9	14	31	39	39	23	17	17
	-1500	0.95 (238)	9	14	30	40	40	26	21	20
	-1000	0.42 (105)	8	12	28	38	41	38	34	23
	-500	0.11 (28)	8	12	27	37	45	48	40	24
	0	---	7	11	26	36	46	48	41	24
	500	0.11 (28)	6	11	25	35	46	49	43	26
	1000	0.42 (105)	5	10	23	33	44	43	39	25
	1500	0.95 (238)	5	9	22	31	40	32	25	24
	1750	1.28 (320)	4	9	22	31	37	28	21	20



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Acoustic Performance

SILENCER LENGTH Inch (mm)	FACE VELOCITY	STATIC PRESSURE DROP Inch.Wg (Pa)	OCTAVE BAND CENTER FREQ (Hz.)							
			63	125	250	500	1000	2000	4000	8000
			INSERTION LOSS (dB)							
LENGTH 48" (1200mm)	-1750	1.115 (279)	9	12	24	30	36	22	17	17
	-1500	0.825 (206)	8	12	24	28	36	25	21	19
	-1000	0.365 (91)	8	11	22	28	34	44	29	21
	-500	0.095 (24)	7	10	22	28	34	44	32	21
	0	---	7	9	21	28	32	44	30	24
	500	0.095 (24)	6	9	20	28	32	42	32	23
	1000	0.365 (91)	5	8	19	26	30	40	32	22
	1500	0.825 (206)	5	8	18	24	30	31	24	22
	1750	1.115 (279)	4	7	18	24	30	28	20	18
LENGTH 36" (900mm)	-1750	0.95 (238)	8	9	18	23	31	21	17	16
	-1500	0.70 (175)	8	8	17	23	30	24	21	17
	-1000	0.31(78)	7	8	16	22	29	36	24	16
	-500	0.08 (20)	7	7	16	21	29	38	25	17
	0	---	7	7	15	20	27	37	25	16
	500	0.08 (20)	6	7	14	19	27	36	26	16
	1000	0.31 (78)	5	7	13	19	26	36	26	17
	1500	0.70 (175)	5	6	13	18	25	31	24	17
	1750	0.95 (238)	4	6	13	18	24	28	20	17
LENGTH 24" (600mm)	-1750	0.85 (213)	6	6	12	15	18	21	16	14
	-1500	0.61 (153)	6	7	12	14	18	21	16	13
	-1000	0.27 (68)	7	6	11	14	17	22	16	14
	-500	0.07 (18)	6	5	11	14	17	22	16	14
	0	---	6	5	10	14	16	22	15	14
	500	0.07 (18)	5	5	10	14	16	21	16	13
	1000	0.27 (68)	5	5	9	13	15	21	16	13
	1500	0.61 (153)	4	5	9	12	15	21	16	13
	1750	0.85 (213)	4	3	9	12	15	20	16	13

AIRFLOW-GENERATED SOUND POWER LEVELS									
FACE VELOCITY	OCTAVE BAND CENTER FREQ (Hz.)								
	1	2	3	4	5	6	7	8	
	63	125	250	500	1000	2000	4000	8000	
-1500	71	58	49	51	55	65	61	55	
-1000	63	49	42	45	53	54	48	39	
-500	60	47	34	37	36	26	21	25	
500	63	50	35	36	34	25	22	27	
1000	64	51	43	45	47	48	43	35	
1500	71	62	53	52	55	58	58	52	

FACE AREA ADJUSTMENT FACTORS							
FACE AREA (Ft ²)	0.5	1	2	4	8	16	32
Adjustment Factor (dB)	-9	-6	-3	0	3	6	9

Self generated power levels listed in the table require adjustment for silencer or silencer banks with face area other than 4 Ft². Add or subtract the following factors to all octave bands.

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SOUND ATTENUATOR

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CSA

ORDERING INFORMATION

MODEL	FLANGE	CASING	AIR WIDTH	LENGTH	WIDTH	HEIGHT
CSA	-	-	-	-	-	X
	↑ 20 : 20 Gauge Galvanized (Standard) 18 : 18 Gauge Galvanized 16 : 16 Gauge Galvanized SS10 : 304 Stainless Steel Construction 1.0 mm thickness SS12 : 304 Stainless Steel Construction 1.2 mm thickness SS15 : 304 Stainless Steel Construction 1.5 mm thickness --: Standard F: With 3.5 cm Duct Mate for galvanized flange and 3.5 cm normal duct flange for Stainless steel Construction			↑ 60: 60 cm 90: 90 cm 120: 120 cm 150: 150 cm 180: 180 cm 210: 210 cm 240: 240 cm		
			↑ 7.5: 7.5 cm 10: 10 cm 15: 15 cm 20: 20 cm			

N.B: - For more information, please check the submittal sheet

Sizes:

- Width: Minimum size of 11" (275mm)
- Height: Minimum size of 8" (200mm)
- Rectangular silencers with weight that exceed 200Kg (441Lbs) are manufactured as multiple section and field assembled (By others).

