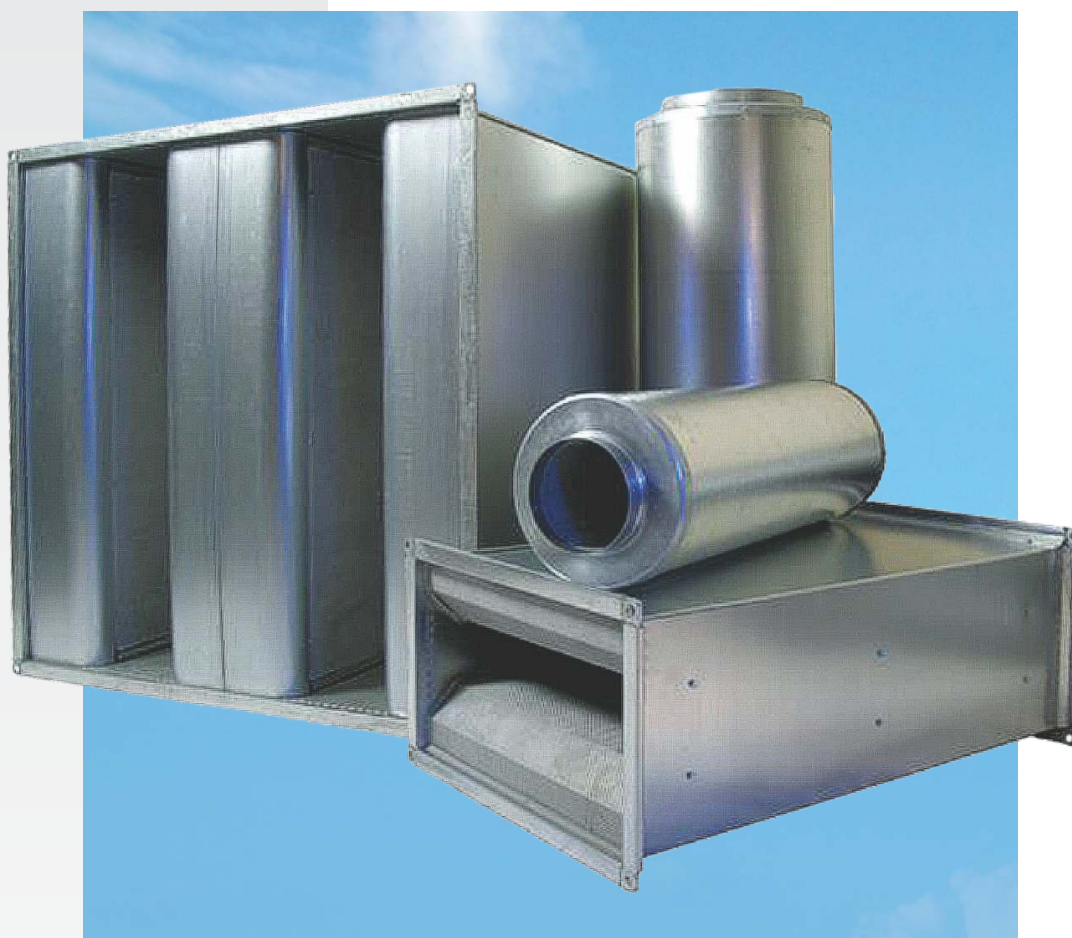


NAK

SOUND ATTENUATORS



IDEAL FOR ALL
HVAC NOISE REDUCING
APPLICATIONS



AIR DISTRIBUTION PRODUCTS SINCE 1976

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A | INTRODUCTION



GENERAL

NAKHOUL Corporation, a leader in the manufacturing of quality HVAC products, engineered, developed, and produced the NAK Sound Attenuator.

- **NAK Sound Attenuators** are fabricated in different models, shapes, widths, and heights, to suit every use and to cover all HVAC ductwork dimensions.
- **NAK Sound Attenuators** are ideal for all HVAC noise reducing applications. These attenuators deliver excellent acoustic attenuation properties across a broad spectrum of sound frequencies, while maintaining low pressure drops.

PERFORMANCE

- **NAK Sound Attenuators** are manufactured in accordance with the applicable standards. They are factory tested for static and dynamic performance. Accurate performance data is generated and updated continuously, through the extensive field testing program.

MANUFACTURING TECHNOLOGY

- **NAK Sound Attenuators** is constructed using High-Tech machineries that largely automate the manufacturing process, resulting in a higher quality and more cost effective product, with a faster delivery period.

NAK SOUND ATTENUATOR'S SELECTION SOFTWARE

- **NAK selection software** provides all the constructional and performance elements of the attenuator. It enables to optimize the selection of the attenuator to suit each individual application.

RIGHT TO ALTERATIONS

As part of its continuous development and innovation program, **Nakhoul Corporation** reserves its right to alter or amend any data or section of this manual without prior notice.

B | RECTANGULAR SOUND ATTENUATORS

NAK-RSA and NAK-RSAB



NAK-RSA



NAK-RSAB

DESCRIPTION

- The rectangular sound attenuators, **NAK-RSA** (straight), and **NAK-RSAB** (Bend) are designed to attenuate the noise generated from HVAC equipment and power generators, which is transmitted to the surroundings through air duct pathways.

- The attenuators are also suitable for a large range of industrial applications.

NAK-RSA(B) is highly effective at low and high frequencies.

The baffles are radiussed at their ends to reduce the regenerated noise, and minimize the air pressure drop across the sound attenuator.

CONSTRUCTION MATERIAL

- The Casing and baffles are manufactured from galvanized steel sheets Z275 (G90), lock forming quality, of minimum 20 Ga.
- Acoustic grade, hygroscopic, and incombustible glass wool and / or mineral wool are used for the infill.
- The acoustic infill layer is faced with a fiberglass fabric protection under a perforated galvanized sheet. This protection prevents the infill erosion against air velocity of up to 25 m/s.
- Standard flange connection, with 30 mm, 40 mm, and 50 mm flange size, depending on the attenuator dimensions. Slip and drive connection available upon Client request.
- The sound attenuators standard construction is rated for in-duct pressures of up to ± 1000 Pa.
- The construction is in accordance with SMACNA standards.

ALTERNATIVE CONSTRUCTION MATERIAL

Upon Client request, **NAK Sound Attenuators** can be constructed using the following materials:

- ▶ Stainless Steel Grades 304 or 316.
- ▶ Galvanized steel epoxy coated.

AIRFLOW REGENERATED NOISE

- The noise generated by high velocity airflow passing through the sound attenuator (Airflow Regenerated Noise) may have an adverse impact on the performance of the sound attenuator.
- In order to limit the effect of Airflow Regenerated Noise, the recommended face velocities across the section of the sound attenuator must be respected (*refer to Table 1*).

Noise Criteria NC	Maximum Permissible Face Velocity V_f (m/s)			
	Sound Attenuator Model (Air Way Width)			
	NAK-RSA 20 -75	NAK-RSA 20 -100	NAK-RSA 20 -150	NAK-RSA 20-200
25	2.4	3.2	3.9	5.0
30	3.2	4.2	5.5	6.2
35	3.8	5.0	6.7	7.4
40	4.6	5.7	7.7	8.9
45	5.4	6.6	8.6	10.4
50	6.2	7.6	9.7	11.6

TABLE 1

NAK-RSA CONSTRUCTION TYPES

- **NAK-RSA 20-75** : Baffle width 200 mm | Air way width 75 mm.
- **NAK-RSA 20-100** : Baffle width 200 mm | Air way width 100 mm.
- **NAK-RSA 20-150** : Baffle width 200 mm | Air way width 150 mm.
- **NAK-RSA 20-200** : Baffle width 200 mm | Air way width 200 mm.

NAK-RSA PERFORMANCE

- **Table 1** gives guidelines for maximum face velocity against design noise level requirements, in order to limit attenuator regenerated noise.
- The pressure loss data assumes a uniform airflow across the attenuator.
- Poor installation conditions could lead to pressure losses higher than the tabulated ones.

SOUND ATTENUATOR INSERTION LOSS IN DB

1 | NAK-RSA 20-75

NAK-RSA 20-75	OCTAVE CENTRE FREQUENCY (HZ)							
Length (mm)	63	125	250	500	1k	2k	4k	8k
600	9	13	22	36	45	39	33	29
900	10	16	27	41	49	47	38	33
1200	11	18	31	46	50	50	43	38
1500	12	21	36	50	50	50	48	42
1800	13	24	41	50	50	50	50	46
2100	14	26	45	50	50	50	50	50
2400	15	29	50	50	50	50	50	50

TABLE 2

2 | NAK-RSA 20-100

NAK-RSA 20-100	OCTAVE CENTRE FREQUENCY (HZ)							
Length (mm)	63	125	250	500	1k	2k	4k	8k
600	7	10	18	34	46	40	33	29
900	8	12	22	37	50	46	36	31
1200	9	14	26	40	50	50	39	33
1500	9	17	30	44	50	50	41	35
1800	10	19	34	47	50	50	44	37
2100	11	21	38	50	50	50	47	39
2400	11	24	42	50	50	50	49	41

TABLE 3

3 | NAK-RSA 20-150

NAK-RSA 20-150	OCTAVE CENTRE FREQUENCY (HZ)							
Length (mm)	63	125	250	500	1k	2k	4k	8k
600	8	12	17	34	44	28	23	22
900	8	14	20	37	47	32	26	24
1200	9	15	23	40	50	36	29	26
1500	10	17	26	43	53	40	32	28
1800	11	18	29	46	57	44	35	31
2100	11	20	32	49	40	48	38	33
2400	12	21	35	50	50	50	41	35

TABLE 4

4 | NAK-RSA 20-200

NAK-RSA 20-200	OCTAVE CENTRE FREQUENCY (HZ)							
Length (mm)	63	125	250	500	1k	2k	4k	8k
600	7	11	16	25	27	23	21	20
900	8	12	18	30	33	26	23	21
1200	8	14	21	35	39	30	25	23
1500	9	15	23	40	44	33	28	24
1800	9	17	26	45	50	37	30	26
2100	10	18	28	50	50	40	32	26
2400	11	19	30	50	50	43	34	28

TABLE 5

SOUND ATTENUATORS PRESSURE LOSS

1 | ATTENUATOR TYPE NAK-RSA 20-75

Pressure Loss Δp , Pa		15	25	35	50	60	75	85	100	110	125
Face Velocity V_f m/s		1.6	2.1	2.4	2.9	3.2	3.5	3.8	4.0	4.3	4.6
Attenuator self-noise guide against face velocity V_f		NC 25				NC 30		NC 35		NC 40	
Width (mm)	Height (mm)	Volume Flow Rate V l/s									
275 ONE MODULE	150	65	85	100	120	130	145	155	165	175	190
	300	130	170	200	240	260	290	310	330	350	380
	450	200	260	300	360	400	430	470	500	530	570
	600	260	350	400	480	530	580	630	660	710	760
	750	330	430	500	600	660	720	780	830	890	950
	900	400	520	590	720	790	870	940	990	1060	1140
550 TWO MODULES	300	260	350	400	480	530	580	630	660	710	760
	450	400	520	590	720	790	870	940	990	1060	1140
	600	530	690	790	960	1060	1160	1250	1320	1420	1520
	750	660	870	990	1200	1320	1440	1570	1650	1770	1900
	900	790	1040	1190	1440	1580	1730	1880	1980	2130	2280
	1050	920	1210	1390	1670	1850	20	2190	2310	2480	2660
825 THREE MODULES	450	590	780	890	1080	1190	1300	1410	1490	1600	1710
	600	790	1040	1190	1440	1580	1730	1880	1980	2130	2280
	750	990	1300	1490	1790	1980	2170	2350	2480	2660	2850
	900	1190	1560	1780	2150	2380	2600	2820	2970	3190	3420
	1050	1390	1820	2080	2510	2770	3030	3290	3470	3720	3980
	1200	1580	2080	2380	2870	3170	3470	3760	3960	4260	4550
1100 FOUR MODULES	600	1060	1390	1580	1910	2110	2310	2510	2640	2840	3040
	750	1320	1730	1980	2390	2640	2890	3140	3300	3550	3800
	900	1580	2080	2380	2870	3170	3470	3760	3960	4260	4550
	1050	1850	2430	2770	3350	3700	4040	4390	4620	4970	5310
	1200	2110	2770	3170	3830	4220	4620	5020	5280	5680	6070
	1350	2380	3120	3560	4310	4750	5200	5640	5940	6390	6830
1375 FIVE MODULES	750	1650	2170	2480	2990	3300	3610	3920	4130	4430	4740
	900	1980	2600	2970	3590	3960	4330	4700	4950	5320	5690
	1050	2310	3030	3460	4190	4620	5050	5490	5780	6210	6640
	1200	2640	3470	3960	4790	5280	5780	6270	6600	7100	7590
	1350	2970	3900	4460	5380	5940	6500	7050	7430	7980	8540
	1500	3300	4330	4950	5980	6600	7220	7840	8250	8870	9490
1650 SIX MODULES	900	2380	3120	3560	4310	4750	5200	5640	5940	6390	6830
	1050	2770	3640	4160	5020	5540	6060	6590	6930	7450	7970
	1200	3170	4160	4750	5740	6340	6930	7520	7920	8510	9110
	1350	3560	4680	5350	6460	7130	7800	8460	8910	9580	10250
	1500	3960	5200	5940	7180	7920	8660	9400	9900	10640	11390
	1650	4360	5720	6530	7900	8710	9530	10350	10890	11710	12520
1800	4750	6240	7130	8610	9500	10400	11290	11880	12770	13660	
	1050	3230	4240	4850	5860	6470	7070	760	8090	8690	9300
	1200	3700	4850	5540	6700	7390	8090	8780	9240	9930	10630
	1350	4160	5460	6240	7540	8320	9100	9880	10400	11170	11950
	1500	4620	6060	6930	8370	9240	10110	10970	11550	12420	13280
	1650	5080	6670	7620	9210	10160	11120	12070	12700	13660	14610
1800	5540	7280	8320	10050	11090	12130	13170	13860	14900	15940	
	1950	6010	7880	9010	10890	12010	13140	14260	15020	16140	17270
	2100	6470	8490	9700	11720	12940	14150	15360	16170	17380	18600
	1200	4220	5540	6340	7660	8450	9240	10030	10560	11350	12140
	1350	4750	6240	7130	8610	9500	10400	11290	11880	12770	13660
	1500	5280	6930	7920	9570	10560	11550	12540	13200	14190	15180
1650	5810	7620	8710	10530	11620	12710	13790	14520	15610	16700	
	1800	6340	8320	950	11480	12670	13860	15050	15840	17030	18220
	1950	6860	9010	10300	12440	13730	15020	16300	17160	18450	19730
	2100	7390	9700	11090	13500	14780	16170	17560	18480	19870	21250
	2250	7920	10400	11880	14360	15840	17330	18810	19800	21290	22770
	2475 NINE MODULES	1350	5350	7020	8020	9690	10690	11690	12700	13370	14370
1500		5940	7800	8910	10770	11880	12990	14110	14850	15960	17080
1650		6530	8580	9800	11840	13070	14290	15520	16330	17560	18790
1800		7130	9360	10690	12920	14260	15590	16930	17820	19160	20490
1950		7720	10140	11580	14000	15440	16890	18340	19300	20750	22200
2100		8320	10910	12470	15070	16630	18190	19750	20790	22350	23910
2250	8910	11690	13370	16150	17820	19480	21160	22280	23950	25620	
	2400	9500	12470	14260	17230	19010	20790	22570	23760	25540	27320

TABLE 6

» The pressure loss data above relates to a straight attenuator 1200mm long. The following factors are applicable to other lengths:

Length L in mm	600	900	1200	1500	1800	2100	2400
Δp factor	x 0.90	x 0.95	0	x 1.05	x 1.10	x 1.15	x 1.20

» For splitter bend attenuators add 40% to the pressure loss for the straight attenuator.

2 | ATTENUATOR TYPE NAK-RSA 20-100

Pressure Loss Δp , Pa		15	25	35	50	60	75	85	100	110	125
Face Velocity V_f m/s		2.1	2.7	3.2	3.8	4.2	4.7	5.0	5.4	5.7	6.0
Attenuator self-noise guide against face velocity V_f		NC 25			NC 30			NC 35		NC 40	
Width (mm)	Height (mm)	Volume Flow Rate V l/s									
300 ONE MODULE	150	95	120	145	170	190	210	225	245	255	270
	300	190	240	290	340	380	420	450	490	510	540
	450	280	360	430	510	570	630	680	730	770	810
	600	380	490	580	680	760	850	900	970	1030	1080
	750	470	610	720	860	950	1060	1130	1220	1280	1350
	900	570	730	860	1030	1130	1270	1350	1460	1540	1620
600 TWO MODULES	300	380	490	580	680	760	850	900	970	1030	1080
	450	570	730	860	1030	1130	1270	1350	1460	1540	1620
	600	760	970	1150	1370	1510	1690	1800	1940	2050	2160
	750	950	1200	1440	1710	1890	2120	2250	2430	2570	2700
	900	1130	1460	1730	2050	2270	2540	2700	2920	3080	3240
	1050	1320	1700	2020	2390	2650	2960	3150	3400	3590	3780
900 THREE MODULES	1200	1510	1940	2300	2740	3020	3380	3600	3830	4100	4320
	450	850	1090	1300	1540	1700	1900	2030	2190	2310	2430
	600	1130	1460	1730	2050	2270	2540	2700	2920	3080	3240
	750	1420	1820	2160	2570	2840	3170	3380	3650	3850	4050
	900	1700	2190	2590	3080	3400	3810	4050	4370	4620	4860
	1050	1990	2550	3020	3590	3970	4440	4730	5100	5390	5670
1200 FOUR MODULES	1200	2270	2920	3460	4100	4540	5080	5400	5830	6160	6480
	1350	2550	3280	3890	4620	5100	5710	6080	6560	6930	7290
	600	1510	1940	2300	2740	3020	3380	3600	3830	4100	4320
	750	1890	2430	2880	3420	3780	4230	4500	4860	5130	5400
	900	2270	2920	3460	4100	4540	5080	5400	5830	6160	6480
	1050	2650	3400	4030	4790	5290	5920	6300	6800	7180	7560
1500 FIVE MODULES	1200	3020	3890	4610	5470	6050	6790	7200	7780	8210	8640
	1350	3400	4370	5180	6160	6800	7610	8100	8750	9230	9720
	1500	3780	4860	5760	6840	7560	8560	900	9720	10260	10800
	750	2360	3040	3600	4280	4730	5290	5630	6080	6410	6750
	900	2840	3650	4320	5130	5670	6350	6750	7290	7700	8100
	1050	3310	4250	5040	5990	6620	7400	7880	8510	8980	9450
1800 SIX MODULES	1200	3780	4860	5760	6840	7560	8460	9000	9720	10260	10800
	1350	4250	5470	6480	7700	8510	9520	10130	10940	11540	12150
	1500	4730	6080	7200	8550	9450	10580	11250	12150	12830	13500
	1650	5200	6680	7920	9410	10400	11630	12380	13370	14110	14850
	1800	5670	7290	8640	10260	11340	12690	13500	14580	15390	16200
	900	3400	4370	5180	6160	6800	7610	8100	8750	9230	9720
2100 SEVEN MODULES	1050	3970	5100	6050	7180	7940	8880	9450	10210	10770	11340
	1200	4540	5830	6910	8210	9070	10150	10800	11660	12310	12960
	1350	5100	6560	7780	9230	10210	11420	12150	13120	13850	14580
	1500	5670	7290	8640	10260	11340	12690	13500	14580	15390	16200
	1650	6240	8020	9500	11290	12470	13960	14850	16040	16930	17820
	1800	6800	8750	10370	12310	13610	15230	16200	17500	18740	19440
2400 EIGHT MODULES	1950	7370	9480	11230	13340	14740	16500	17550	18950	20010	21060
	1050	4630	5950	7060	8380	9260	10360	11030	11910	12570	13230
	1200	5290	6800	8060	9580	10580	11840	12600	13610	14360	15120
	1350	5950	7650	9070	10770	11910	12320	14180	15310	16160	17010
	1500	6620	8510	10080	11970	13230	14810	15750	17010	17960	18900
	1650	7280	9360	11090	13170	14550	16290	17330	18710	19750	20790
2700 NINE MODULES	1800	7940	10210	12100	14360	15880	17770	18900	20410	21550	22680
	1950	8600	11060	13100	15560	17200	19250	20480	22110	23340	24570
	2100	9260	11910	14110	16760	18520	20730	22050	23810	25140	26460
	2250	9920	12760	15120	17960	19850	22210	23630	25520	26930	28350
	1200	6050	7780	9220	10940	12100	13540	1440	15550	16440	17280
	1350	6800	8750	10370	12310	13610	15230	16200	17500	18470	19440
3000 TEN MODULES	1500	7560	9720	11520	13680	15120	16920	18000	19440	20520	21600
	1650	8320	10690	12670	15050	16630	18610	19800	21380	22570	23760
	1800	9070	11670	13820	16420	18140	20300	21600	23330	24620	25920
	1950	9830	12640	14980	17780	19660	22000	23400	25270	26680	28080
	2100	10580	13610	16130	19150	21170	23690	25200	27220	28730	30240
	2250	11340	14580	17280	20520	22680	25380	27000	29160	30780	32400
3300 ELEVEN MODULES	2400	12100	15560	18430	21890	24190	27070	28800	31100	32830	34560

TABLE 7

» The pressure loss data above relates to a straight attenuator 1200mm long. The following factors are applicable to other lengths:

Length L in mm	600	900	1200	1500	1800	2100	2400
Δp factor	x 0.90	x 0.95	0	x 1.05	x 1.10	x 1.15	x 1.20

» For splitter bend attenuators add 40% to the pressure loss for the straight attenuator.

3 | ATTENUATOR TYPE NAK-RSA 20-150

Pressure Loss Δp, Pa		15	25	35	50	60	75	85	100	110	125
Face Velocity V _f m/s		3.0	3.9	4.6	5.5	6.0	6.7	7.1	7.7	8.1	8.6
Attenuator self-noise guide against face velocity V _f		NC 25			NC 30		NC 35		NC 40		NC 45
Width (mm)	Height (mm)	Volume Flow Rate V l/s									
350 ONE MODULE	150	160	205	240	290	315	350	375	405	425	450
	300	320	410	480	580	630	700	750	810	850	900
	450	470	610	720	870	950	1060	1120	1210	1280	1350
	600	630	820	970	1160	1260	1410	1490	1620	1700	1810
	750	790	1020	1210	1440	1580	1760	1860	2020	2130	2260
	900	950	1230	1450	1730	1890	2110	2240	2430	2550	2710
700 TWO MODULES	450	950	1230	1450	1730	1890	2110	2240	2430	2550	2710
	600	1260	1640	1930	2310	2520	2810	2980	3230	3400	3610
	750	1580	2050	2420	2890	3150	3520	3720	4040	4250	4520
	900	1890	2460	2900	3470	3780	4220	4470	4850	5100	5420
	1050	2210	2870	3380	4040	4410	4920	5220	5660	5950	6320
	1200	2520	3280	3860	4620	5040	5630	5960	6470	6800	7220
1050 THREE MODULES	600	890	2460	2900	3470	3780	4220	4470	4850	5100	5420
	750	2360	3070	3620	4330	4730	5280	5590	6060	6380	6770
	900	2840	3690	4350	5200	5670	6330	6710	7280	7650	8130
	1050	3310	4300	5070	6060	6620	7390	7830	8490	8930	9480
	1200	3780	4910	5800	6930	7560	8440	8950	9700	10210	10840
	1350	4250	5530	6520	7800	8510	9500	10060	10910	11480	12190
1400 FOUR MODULES	1500	4730	6140	7240	8660	9450	10550	11180	12130	12760	13550
	750	3150	4090	4830	5780	6300	7040	7460	8090	8510	9030
	900	3780	4910	5800	6930	7560	8440	8950	9700	10210	10840
	1050	4410	5730	6760	8090	8820	9850	10440	11320	11110	12640
	1200	5040	6550	7730	9240	10080	11260	11930	12940	13610	14450
	1350	5670	7370	8690	10400	11340	12660	13420	14550	15310	16250
1750 FIVE MODULES	1500	6300	8190	9660	11550	12600	14070	4910	16170	17010	18060
	1650	6930	9010	10630	12710	13860	15480	16400	17790	18710	19870
	1800	7560	9830	11590	13860	15120	16880	17890	19400	20410	21670
	900	4730	6140	7250	8660	9450	10550	11180	12130	12760	13550
	1050	5510	7170	8450	10110	11030	12310	13050	14150	14880	15800
	1200	6300	8190	9660	11550	12600	14070	14910	16170	17010	18060
2100 SIX MODULES	1350	7090	9290	10870	12990	14180	15830	16770	18190	19140	20320
	1500	7880	10240	12080	14440	15750	17590	18640	20210	21260	22580
	1650	8660	11260	13280	15880	17330	19350	20500	22230	23390	24830
	1800	9450	12290	14490	17330	18900	21110	22370	24260	25520	27090
	1950	10240	13310	15700	18770	20480	22860	24230	26280	27640	29350
	2100	11030	14330	16910	20210	22050	24620	26090	28300	29770	31610
2100 SIX MODULES	1050	6620	8600	10140	12130	13230	147701	15660	16980	17860	18960
	1200	7560	9830	11590	13860	15120	6880	17890	19400	20410	21670
	1350	8510	11060	13040	15590	17010	19000	20130	21830	22960	24380
	1500	9450	12290	14490	17330	18900	21110	22370	24260	25520	27090
	1650	10400	13510	15940	19060	20790	23220	24600	26680	28070	29800
	1800	11340	14740	17390	20790	22680	25330	26840	29110	30620	32510
2450 SEVEN MODULES	1950	12290	15970	18840	22520	24510	27440	29070	31530	33170	35200
	2100	13230	17200	20290	24260	26460	29550	31310	33960	35700	37900
	2250	14180	18430	21740	25990	28350	31660	33550	36380	38270	40640
	1200	8820	11470	13520	16170	17640	19700	20870	22640	23810	25280
	1350	9920	12800	15210	18190	19850	22160	23480	25470	26790	28440
	1500	11030	14330	16910	20210	22050	24620	26090	28300	29770	31610
2450 SEVEN MODULES	1650	12130	15770	18600	22230	24260	27080	28700	31130	32740	34770
	1800	13230	17200	20290	24260	26460	29550	31310	33960	35700	37900
	1950	14330	18630	21980	26280	28670	32000	33940	36800	38700	41100
	2100	15440	20070	23670	28300	30870	34470	36500	39600	41700	44300
	2250	16540	21500	25360	30320	33080	36900	39100	42500	44600	47400
	2400	17640	22930	27050	32340	35300	39400	41700	45300	47600	50500

TABLE 8

» The pressure loss data above relates to a straight attenuator 1200mm long. The following factors are applicable to other lengths:

Length L in mm	600	900	1200	1500	1800	2100	2400
Δp factor	x 0.90	x 0.95	0	x 1.05	x 1.10	x 1.15	x 1.20

» For splitter bend attenuators add 40% to the pressure loss for the straight attenuator.

4 | ATTENUATOR TYPE NAK-RSA 20-200

Pressure Loss Δp , Pa		15	25	35	50	60	75	85	100	110	125
Face Velocity V_f m/s		4.0	5.0	6.2	7.4	8.0	8.9	9.6	10.4	11.0	11.6
Attenuator self-noise guide against face velocity V_f		NC 25		NC 30	NC 35	NC 40		NC 45		NC 50	
Width (mm)	Height (mm)	Volume Flow Rate V l/s									
400 ONE MODULE	150	240	300	370	445	480	535	575	625	660	695
	300	480	600	740	890	960	1070	1150	1250	1320	1390
	450	720	900	1120	1330	1440	1600	1730	1870	1980	2090
	600	960	1200	1490	1780	1920	2140	2300	2500	2640	2780
	750	1200	1500	1860	2220	2400	2670	2880	3120	3300	3480
	900	1440	1800	2230	2660	2880	3200	3460	3740	3960	4180
	1050	1680	2100	2600	310	3360	3740	4030	4370	4620	4870
	1200	1920	2400	2980	3550	3840	4270	4610	4990	5280	5570
800 TWO MODULES	450	1440	1800	2230	2660	2880	3200	3460	3740	3960	4180
	600	1920	2400	2980	3550	3840	4270	4610	4990	5280	5570
	750	2400	3000	3720	4440	4800	5340	5760	6240	6600	6960
	900	2880	3600	4460	5330	5760	6410	6910	7490	7920	8350
	1050	3660	4200	5210	6220	6720	7480	8060	8740	9240	9740
	1200	3840	4800	5950	7100	7680	8540	9220	9980	10560	11140
	1350	4320	5400	6700	7990	8640	9610	10370	11230	11880	12530
	1500	4800	6000	7440	8880	9600	10680	11520	12480	13200	13920
1200 THREE MODULES	600	2880	3600	4460	5330	5760	6410	6910	7490	7920	8350
	750	3600	4500	5580	6660	7200	8010	8640	9360	9900	10440
	900	4320	5400	6700	7990	8640	9610	10370	11230	11880	12530
	1050	5040	6300	7810	9320	10080	11210	12096	13100	13860	14620
	1200	5760	7200	8930	10660	11520	12820	13820	14980	15840	16700
	1350	6480	8100	10040	11990	12960	14420	15550	16850	17820	18790
	1500	7200	9000	11160	13320	14400	16020	17280	18720	19800	20880
	1650	7920	9900	12280	14650	15840	17620	19010	20590	21780	22970
1600 FOUR MODULES	1800	8640	10800	13390	15980	17280	19220	20740	22460	23760	25060
	900	5760	7200	8930	10660	11520	12820	13820	14980	5840	16700
	1050	6720	8400	10420	12430	13440	14950	16130	17470	18480	19490
	1200	7680	9600	11900	14210	15360	17090	18430	19970	21120	22270
	1350	8640	10800	13390	15980	17280	19220	20740	22460	23760	25060
	1500	9600	12000	14880	17760	19200	21360	23040	24960	26400	27840
	1650	10560	13200	16370	19540	21120	24500	25340	27460	29040	30630
	1800	11520	14400	17860	21310	23040	25630	27650	29950	31680	33410
2000 FIVE MODULES	1950	12480	15600	19340	23090	24960	27770	29950	32450	34320	36190
	2100	13440	16800	20830	24860	26880	29900	32260	34940	36960	38980
	1050	8400	10500	13020	15540	16800	18690	20160	21840	23100	24360
	1200	9600	12000	14880	17760	19200	21360	23040	24960	26400	27840
	1350	10800	13500	16740	19980	21600	24030	25920	28080	29700	31320
	1500	12000	15000	18600	22200	24000	26700	28800	31200	33000	34800
	1650	13200	16500	20460	24420	26400	29370	31680	34320	36300	38280
	1800	14400	18000	22320	26640	28800	32040	34560	37440	39600	41760
2400 SIX MODULES	1950	15600	19500	24180	28860	31200	34710	37440	40560	42900	45240
	2100	16800	21000	26040	31080	33600	37380	40320	43680	46200	48720
	2250	18000	22500	27900	33300	36000	40050	43200	46800	49500	52200
	2400	19200	24000	29760	35520	38400	42720	46080	49920	52800	55680
	1200	11520	14400	17860	21310	23040	25630	27650	29950	31680	33400
	1350	12960	16200	20090	23980	25920	28840	31100	33670	35640	37580
	1500	14400	18000	22320	26640	28800	32040	34560	37440	39600	41760
	1650	15840	19800	24550	29300	31680	35240	38020	41180	43560	45940
2400 SIX MODULES	1800	17280	21600	26780	31970	34560	38450	41470	44930	47520	50110
	1950	18720	23400	29020	34630	37440	41650	44930	48670	51480	54290
	2100	20160	25200	31250	37300	40320	44860	48380	52420	55440	58460
	2400	23040	28800	35710	42620	46080	51260	55300	59900	63360	66820

TABLE 9

» The pressure loss data above relates to a straight attenuator 1200mm long. The following factors are applicable to other lengths:

Length L in mm	600	900	1200	1500	1800	2100	2400
Δp factor	x 0.90	x 0.95	0	x 1.05	x 1.10	x 1.15	x 1.20

» For splitter bend attenuators add 40% to the pressure loss for the straight attenuator.

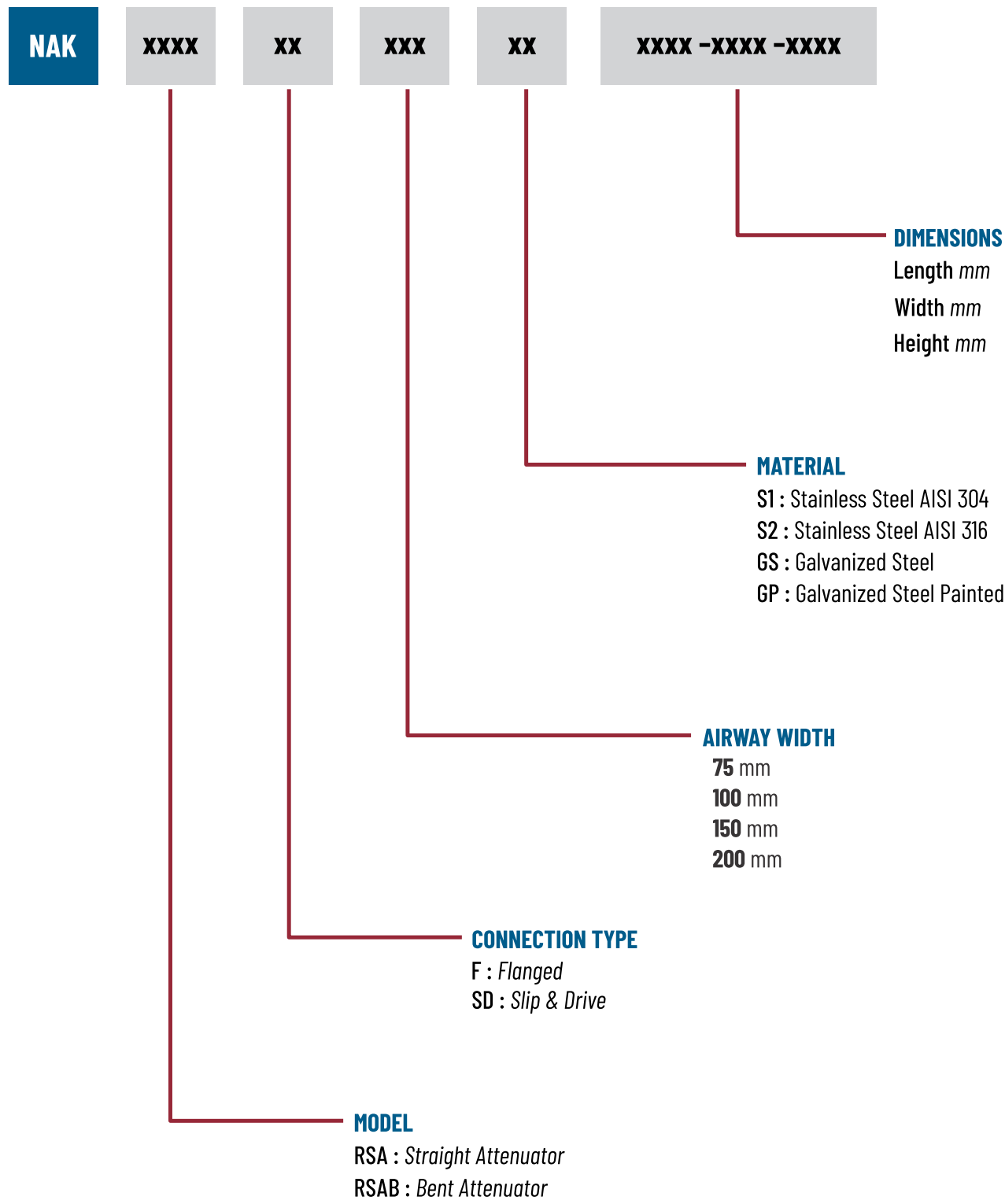


NAK-RSA SOUND ATTENUATORS WEIGHTS

Width (mm)	NAK-RSA 20-75 NAK-RSA 20-100	275 300	550 600	825 900	1100 1200	1325 1500	1650 1800	1925 2100
	NAK-RSA 20-150 NAK-RSA 20-200	350 400	700 800	1050 1200	1400 1600	1750 2000	2100 -	- -
	NUMBER OF MODULES	1	2	3	4	5	6	7
Length (mm)	Height H (mm)	Approximate Weight (kg)						
600	300	16	26	36	46	56	64	70
	600	23	36	49	62	75	87	95
	900	30	46	62	78	94	110	120
	1200	37	56	75	93	113	132	145
	1500	-	66	82	110	131	153	169
	1800	-	-	106	132	159	185	205
900	300	22	36	49	63	77	90	98
	600	31	49	66	84	102	119	130
	900	41	63	84	106	128	150	164
	1200	50	76	101	127	153	179	197
	1500	-	90	116	148	178	207	229
	1800	-	-	144	180	216	252	280
1200	300	26	44	61	79	97	115	123
	600	38	60	82	104	127	149	162
	900	50	78	106	133	161	189	207
	1200	63	95	127	160	192	225	248
	1500	-	113	149	186	224	261	289
	1800	-	-	182	227	273	319	355
1500	300	30	51	72	92	118	134	144
	600	44	70	96	121	147	173	188
	900	58	90	122	154	186	218	239
	1200	72	110	147	185	222	259	286
	1500	-	130	172	215	258	301	333
	1800	-	-	210	262	315	368	409
1800	300	42	70	95	122	150	176	193
	600	60	96	130	165	201	235	256
	900	80	124	166	208	252	297	325
	1200	98	150	199	250	301	355	390
	1500	-	178	230	293	351	411	454
	1800	-	-	284	355	427	500	554
2100	300	46	78	108	140	172	203	219
	600	67	107	146	186	227	265	290
	900	89	138	187	236	286	335	365
	1200	110	167	225	284	340	400	440
	1500	-	200	261	330	398	464	513
	1800	-	-	322	401	485	565	629

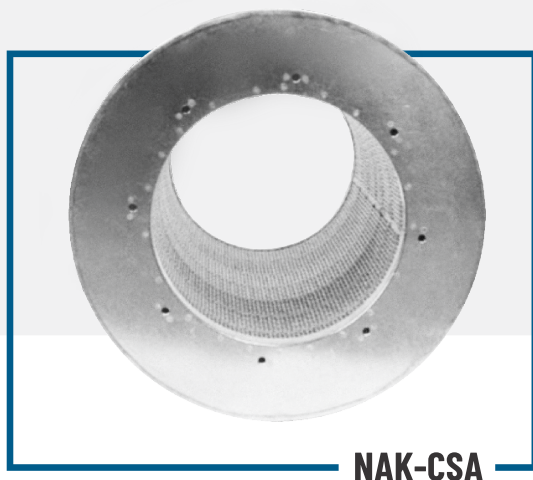
TABLE 10

NAK-RSA & NAK-RSAB MODEL NUMBERS

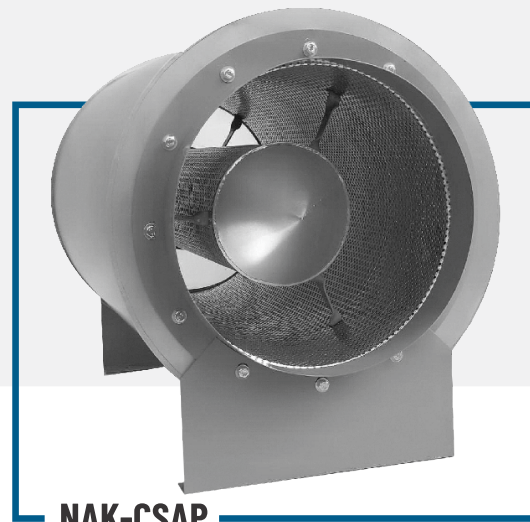


C | CYLINDRICAL SOUND ATTENUATOR

NAK-CSA and NAK-CSAP



NAK-CSA



NAK-CSAP

DESCRIPTION

- The cylindrical sound attenuators, **NAK-CSA**, and **NAK-CSAP** are designed to attenuate the noise generated from HVAC equipment, which is transmitted to the surroundings through round air duct pathways.
- The attenuators are also suitable for a large range of industrial applications.
- **NAK-CSA(P)** is effective at low and high frequencies and provides good noise attenuation.

TWO TYPES OF CYLINDRICAL SOUND ATTENUATORS ARE AVAILABLE :

- **NAK-CSA** : A straight through design, offering good acoustic performance and negligible pressure loss.
- **NAK-CSAP** : A design containing an aerodynamically acoustic efficient concentric Pod. This type is used in round ductwork, and provides higher attenuation performances.

CONSTRUCTION MATERIAL

The cylindrical attenuator are prefabricated sections of double wall ductwork with solid outer shell and perforated inner shell.

- The Casing and Pod are manufactured from galvanized steel sheets Z275 (G90), lock forming quality, of minimum 20 Ga.
- Acoustic grade, hygroscopic, and incombustible glass wool and / or mineral wool are used for the infill.
- The acoustic infill layer is faced with a fiberglass fabric protection under a perforated galvanized sheet. This protection prevents the infill erosion against air velocity of up to 25 m/s.
- The sound attenuators standard construction is rated for in-duct pressures of up to ± 1000 Pa.
- The construction is in accordance with SMACNA standards.

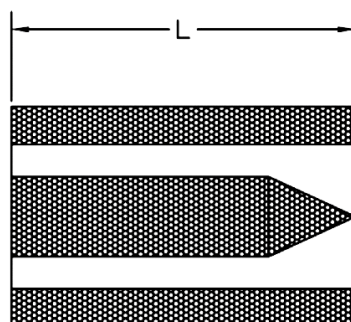
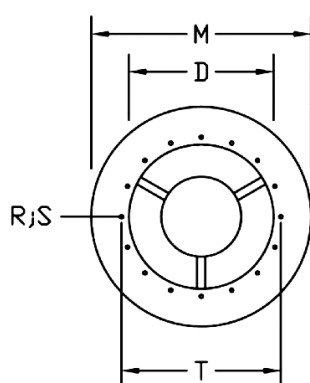
CONNECTION TO DUCTWORK

- **NAK-CSA & NAK-CSAP**

are available in either flanged connection or spigot connection.

DIMENSIONAL DATA

DIMENSIONAL DATA | NAK-CSA & NAK-CSAP



M : Outside diameter

D : Inside diameter

T : Distance between 2 holes

R : Number of holes

S : Thread size

L : Length

DESCRIPTION	D (cm)	M (cm)	L (cm)	L (cm)	T (cm)	R	S (mm)
			1D	2D			
NAK-CSA / NAK-CSAP 250	25.6	45.6	25	50	28.6	6	6
NAK-CSA / NAK-CSAP 315	32.2	52.2	30	60	35.6	8	8
NAK-CSA / NAK-CSAP 355	36.1	56.1	35	70	39.5	8	8
NAK-CSA / NAK-CSAP 400	40.4	60.4	40	80	43.8	12	8
NAK-CSA / NAK-CSAP 450	45.3	65.3	45	90	48.7	12	8
NAK-CSA / NAK-CSAP 500	50.7	70.7	50	100	54.1	12	8
NAK-CSA / NAK-CSAP 560	56.4	76.4	55	110	60.5	16	10
NAK-CSA / NAK-CSAP 630	63.8	83.8	60	120	67.4	16	10
NAK-CSA / NAK-CSAP 710	71.5	91.5	70	140	75.1	16	10
NAK-CSA / NAK-CSAP 800	80.1	100.1	80	160	83.7	24	10
NAK-CSA / NAK-CSAP 900	89.8	109.8	90	180	93.4	24	10
NAK-CSA / NAK-CSAP 1000	100.7	120.7	100	200	104.3	24	10
NAK-CSA / NAK-CSAP 1120	113	133	110	220	117.4	24	10
NAK-CSA / NAK-CSAP 1250	126.7	146.7	125	250	131.1	24	10
NAK-CSA / NAK-CSAP 1400	142.1	162.1	140	280	146.5	24	10
NAK-CSA / NAK-CSAP 1600	159.3	179.3	160	320	163.7	32	10

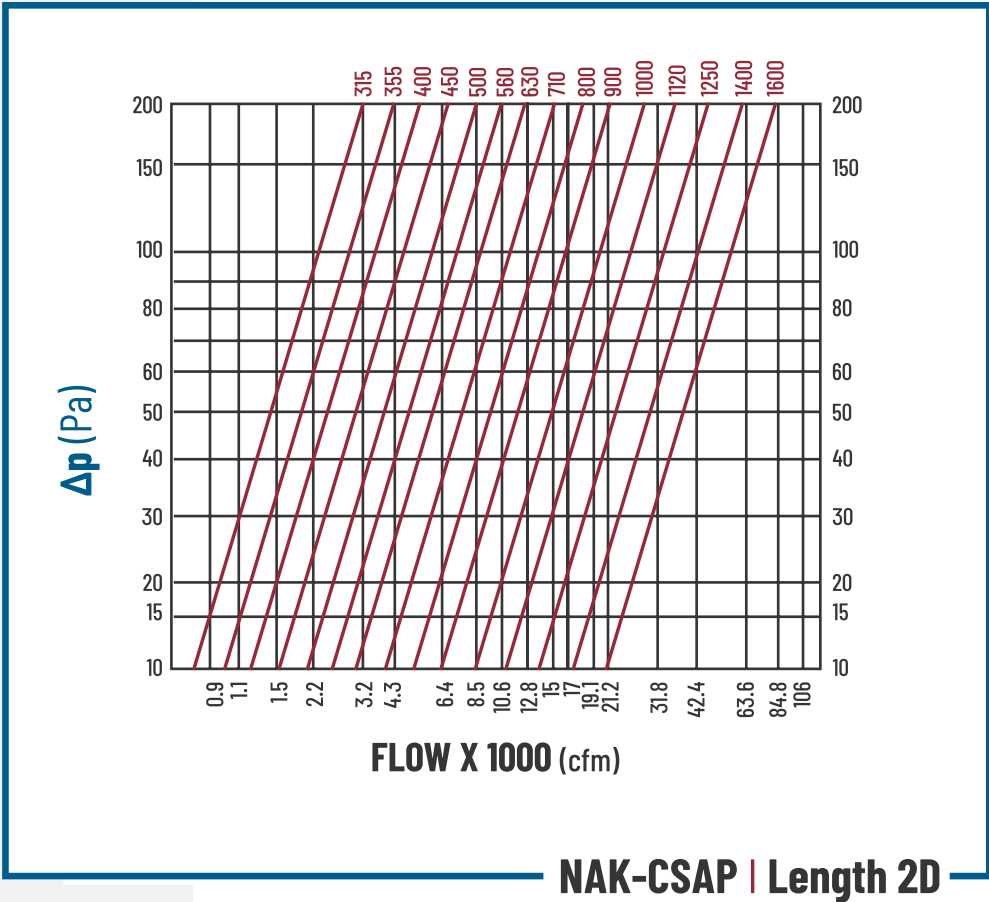
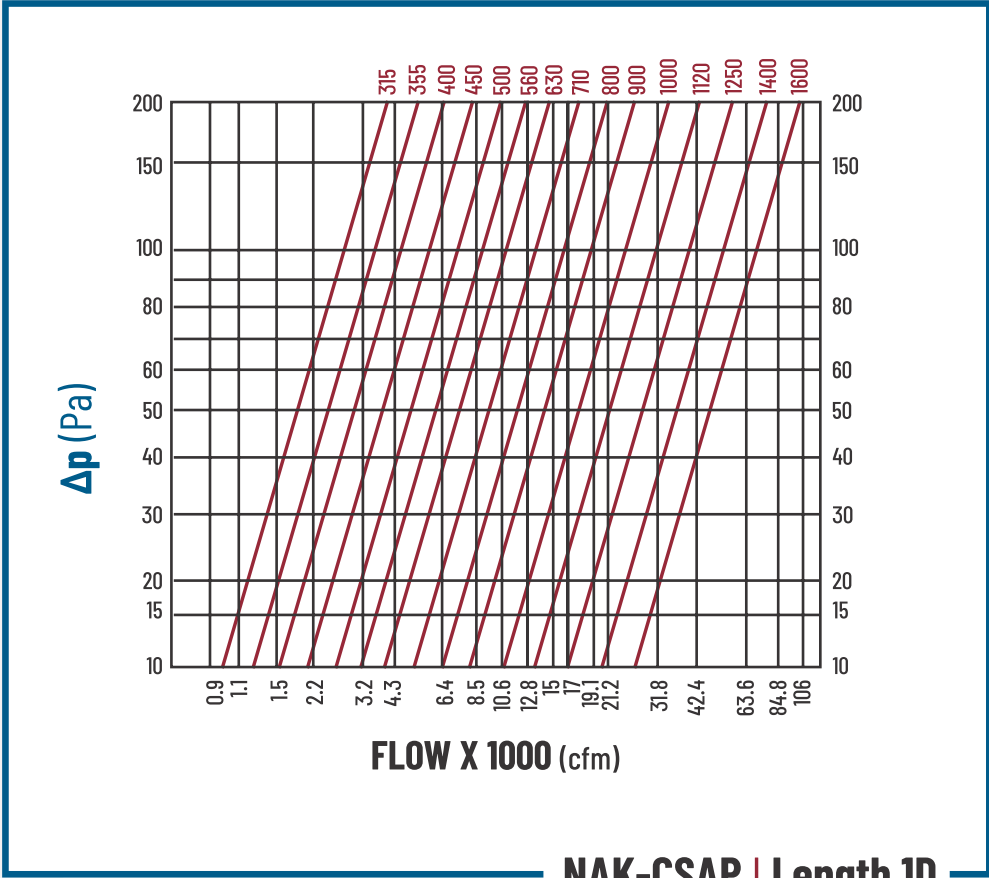
TABLE 11

- **NAK-CSA** and **NAK-CSAP** have the same dimensional data.
- Above dimensions relates to flanged connection. For spigot connection, add 100 mm from each side.

INSERTION LOSS TABLES

		OCTAVE CENTER FREQUENCY (Hz)							
		63	125	250	500	1k	2k	4k	8k
DESCRIPTION	Length (cm)	INSERTION LOSS (dB)							
NAK-CSA 250	1D	2	3	6	11	12	7	6	4
	2D	4	5	10	21	22	13	10	8
NAK-CSA 315	1D	2	3	6	11	12	7	6	4
NAK-CSA 355		2	3	6	11	12	7	6	4
NAK-CSA 400	2D	4	5	10	21	22	13	10	8
NAK-CSA 450		4	5	10	21	22	13	10	8
NAK-CSA 500	1D	2	3	6	11	10	6	5	4
NAK-CSA 560		2	3	6	11	10	6	5	4
NAK-CSA 630	2D	4	5	10	21	20	10	9	6
NAK-CSA 710		4	5	10	21	20	10	9	6
NAK-CSA 800	2D	4	5	10	21	20	10	9	6
NAK-CSA 900		4	5	10	21	20	10	9	6
NAK-CSA 1000	1D	2	3	6	11	8	5	4	3
NAK-CSA 1120		2	3	6	11	8	5	4	3
NAK-CSA 1250	2D	4	5	10	21	16	9	8	5
NAK-CSA 1400		4	5	10	21	16	9	8	5
NAK-CSA 1600	2D	4	5	10	21	16	9	8	5

PRESSURE LOSS CHARTS

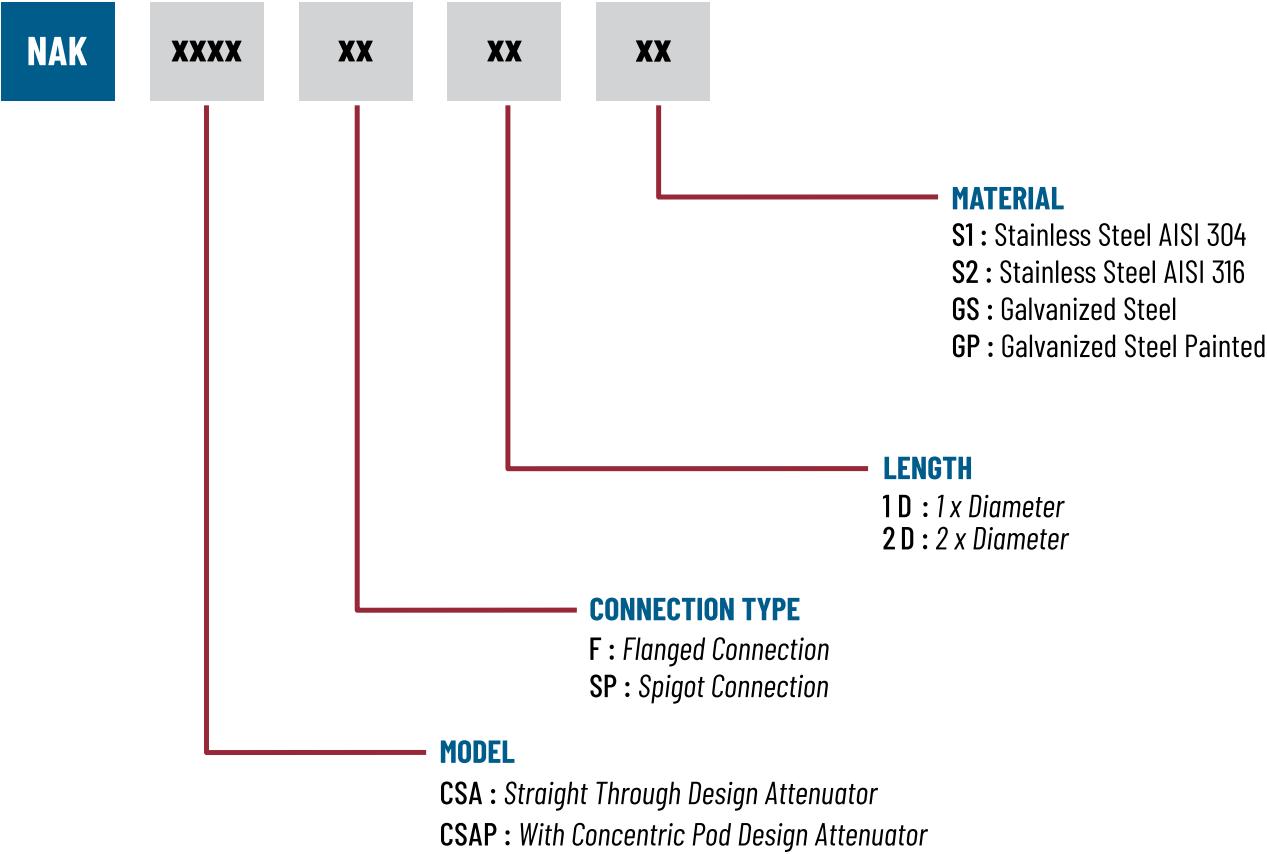


NAK-CSA & NAK-CSAP SOUND ATTENUATORS WEIGHTS

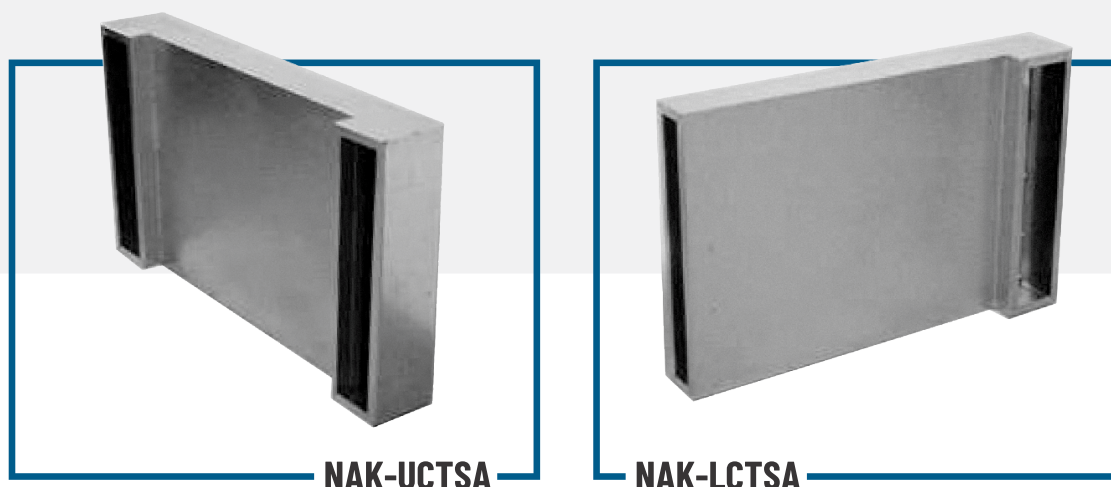
APPROXIMATE WEIGHT (KG)				
UNIT SIZE Ø	NAK-CSA 1D	NAK-CSA 2D	NAK-CSAP 1D	NAK-CSAP 2D
250	9	13	-	-
315	11	15	14	20
355	15	21	20	28
400	18	27	26	36
450	24	35	34	42
500	29	41	41	57
560	35	50	50	70
630	42	58	58	82
710	51	72	72	100
800	58	82	79	111
900	70	100	97	135
100	95	135	120	185
1120	115	160	145	215
1250	130	180	165	240
1400	210	420	270	520
1600	250	490	320	620

TABLE 14

NAK-CSA & NAK-CSAP MODEL NUMBERS



D | CROSS TALK SOUND ATTENUATOR



DESCRIPTION

- The Cross Talk sound attenuators, **NAK-SCTSA** (Straight Shape), **NAK-LCTSA** (L Shape), and **NAK-UCTSA** (U Shape) are designed to avoid noise transmission between interconnected rooms.
- **NAK-SCTSA** attenuator is designed for in-line duct mounting where rooms are served by branches from a common main duct.
- The Cross Talk sound attenuators is used as an airway for air transfer between adjoining areas where the acoustic integrity of a common partition or ceiling needs to be maintained.

CONSTRUCTION MATERIAL

- The Casing and baffles are manufactured from galvanized steel sheets Z275 (G90), lock forming quality, of minimum 22 Ga.
- Acoustic grade, hygroscopic, and incombustible glass wool & or mineral wool are used for the infill.
- The acoustic infill layer is faced with a fiberglass fabric protection under a perforated galvanized sheet. This protection prevents the infill erosion against air velocity of up to 25 m/s.
- The construction is in accordance with SMACNA standards.

ALTERNATIVE CONSTRUCTION MATERIAL

Upon Client request, NAK Cross Talk Sound Attenuators can be constructed using the following materials:

- Stainless Steel Grades 304 or 316.
- Galvanized steel epoxy coated.

NAK-SCTSA PERFORMANCE

» NAK-SCTSA SOUND ATTENUATOR INSERTION LOSS IN dB

ATTENUATOR LENGTH Lmm	OCTAVE CENTRE FREQUENCY (HZ)							
	63	125	250	500	1k	2k	4K	8k
500	5	7	10	15	23	17	13	11
750	6	9	14	23	37	29	22	16
1000	8	11	19	31	48	37	28	21
1250	9	14	23	23	50	44	32	26
1500	10	16	27	45	50	50	31	31

- For NAK-UCTSA attenuators add 30% to the Insertion loss for the straight attenuator.
- For NAK-LCTSA attenuators add 15% to the Insertion loss for the straight attenuator.

TABLE 15

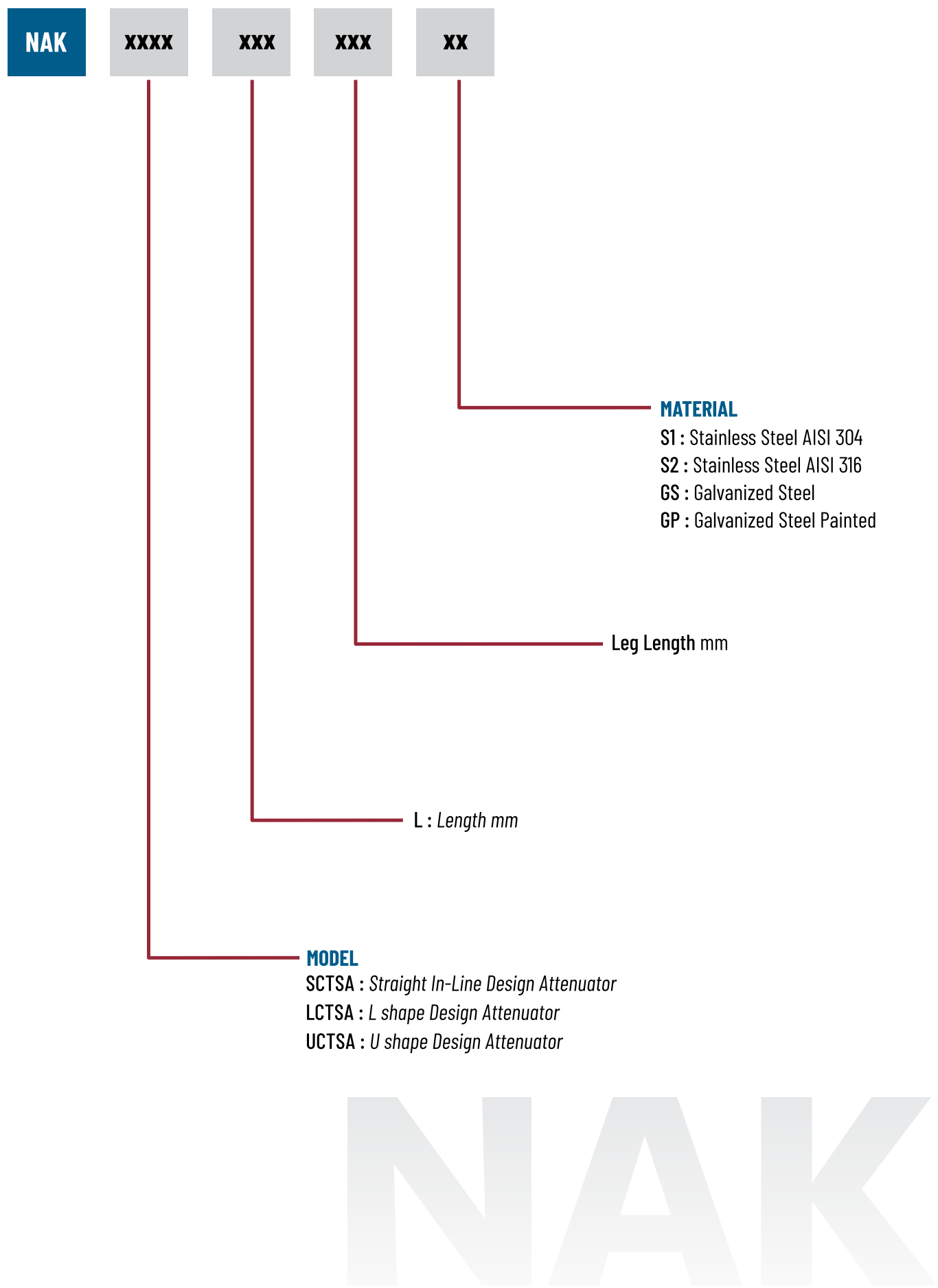
» NAK-SCTSA SOUND ATTENUATOR PRESSURE LOSS

AIR VELOCITY(m/s)		2.0		3.0		4.0		5.0	
NOISE CRITERIA AGAINST VELOCITY		NC 25		NC 30		NC 35		NC 40	
ATTENUATOR SIZE WXH (MM)		Flow rate (l/s)	Δp (Pa)	Flow rate (l/s)	Δp (Pa)	Flow rate (l/s)	Δp (Pa)	Flow rate (l/s)	Δp (Pa)
100	100	20	5	30	5	40	5	50	5
150	100	30	5	45	5	60	5	75	5
200	100	40	5	60	5	80	5	100	5
150	150	45	5	70	5	90	5	115	10
200	150	60	5	90	5	120	5	150	10
250	150	75	5	115	5	150	5	190	10
300	150	90	5	135	5	180	5	225	10
200	200	80	5	120	10	160	15	200	25
250	200	100	5	150	10	200	15	250	25
300	200	120	5	180	10	240	15	300	25
350	200	140	5	210	10	280	15	350	25
400	200	160	5	240	10	320	15	400	25
250	250	125	10	190	20	250	35	315	50
300	250	150	10	225	20	300	35	375	50
350	250	175	10	265	20	350	35	440	50
400	250	200	10	300	20	400	35	500	50
450	250	225	10	340	20	450	35	565	50
500	250	250	10	375	20	500	35	625	50
300	300	180	15	270	30	360	55	450	85
350	300	210	15	315	30	420	55	525	85
400	300	240	15	360	30	480	55	600	85
450	300	270	15	405	30	540	55	675	85
500	300	300	15	450	30	600	55	750	85
550	300	330	15	495	30	660	55	825	85
600	300	360	15	540	30	720	55	900	85

- For NAK-UCTSA attenuators add 45% to the Insertion loss for the straight attenuator.
- For NAK-LCTSA attenuators add 25% to the Insertion loss for the straight attenuator.

TABLE 16

NAK CROS TALK SOUND ATTENUATORS MODEL NUMBERS





*improving
the Air you Breathe*

NAK

SOUND ATTENUATORS

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