

# BELflor

Sales and Marketing :

## BELflor

Belflor Resources Sdn Bhd  
(Co. No. 750261 X)

Fabrication yard :

## BEL NC

Bel NC Sdn Bhd  
(Co. No. 763922 U)

Lot. 773, No. 10B, Jalan Subang 4, Subang Jaya Light Industrial Park,  
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Tel: 603-8042 6697 Fax: 603-8042 6702 E-mail: [ianypng@belnc.com](mailto:ianypng@belnc.com)

Website: [www.belnc.com](http://www.belnc.com)

**BEL** Noise Control specializes in acoustic product and noise control. We ascertain that our acoustic products were developed to meet the strictest requirements.

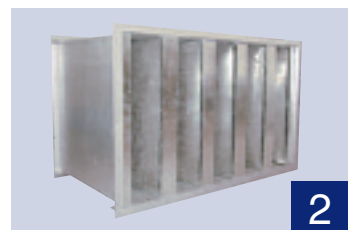
Our BEL Noise Control product is designed based on the principle of maximum noise reduction while favoring minimized pressure drop for silencing element required ventilation.

To reach these high performance levels, our engineers work successfully to minimize the problem caused by unwanted acoustical phenomena which will cause reduction in actual acoustic performance.

To ensure the high acoustic performance we ensure that the metal sheet used to make the acoustic product, the acoustic media and its properties is carefully selected. The standard operation procedure of BEL Noise Control product fabrication process will ensure that all joint is perfectly sealed to avoid any acoustic leakage.

You will see the excellent performance obtained by our acoustic product in this brochure.

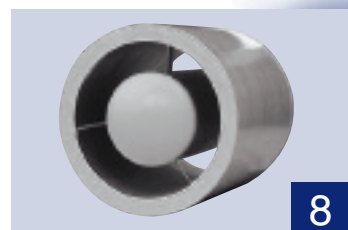
## Content



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# BEL RECTANGULAR SILENCER

## Construction

### Body of the silencer:

- Exterior casing in galvanized steel, stainless steel or other welded material.
- Exterior casing in steel with minimum 0.8mm thickness with structural steel.
- Additional reinforcements (frame, angle, etc)
- Special paint finishes for certain environment condition.
- Holes on flange for lifting and connection.

### Baffles:

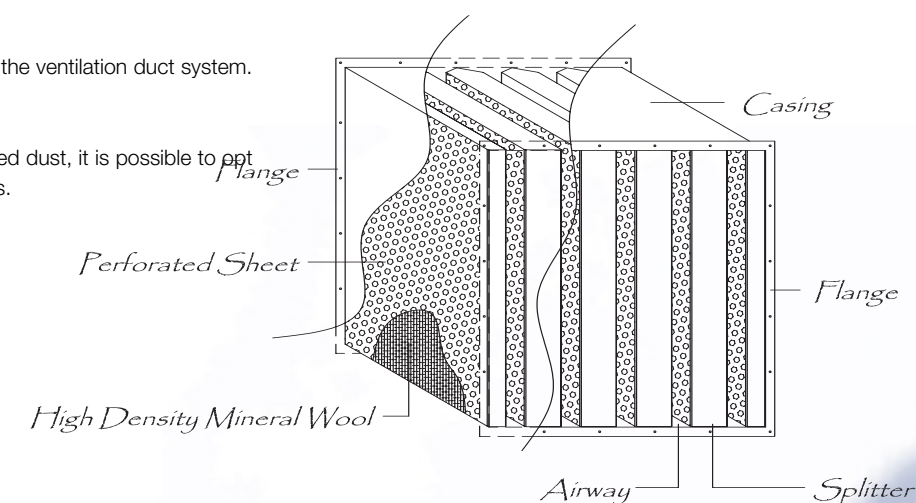
- Choice of wool types (rockwool, fiberglas, etc)
- Choice of wool thickness and density.
- Polyester film, black matt finished, glass cloth, etc to protect the acoustic media from oil, water, fiber erosion, etc.
- Hexagon profile for flow entry and taper end for flow discharge to limit turbulence and pressure drop.
- Perforated galvanized steel, stainless steel or other material.
- Baffles assemble with internal structure.

### Connecting flanges:

- Angle iron or TDC/TDF flanges to connect to the ventilation duct system.

### Special assembly:

- In case of concentrated smoke or accumulated dust, it is possible to opt for periodic cleaning or replacement of baffles.



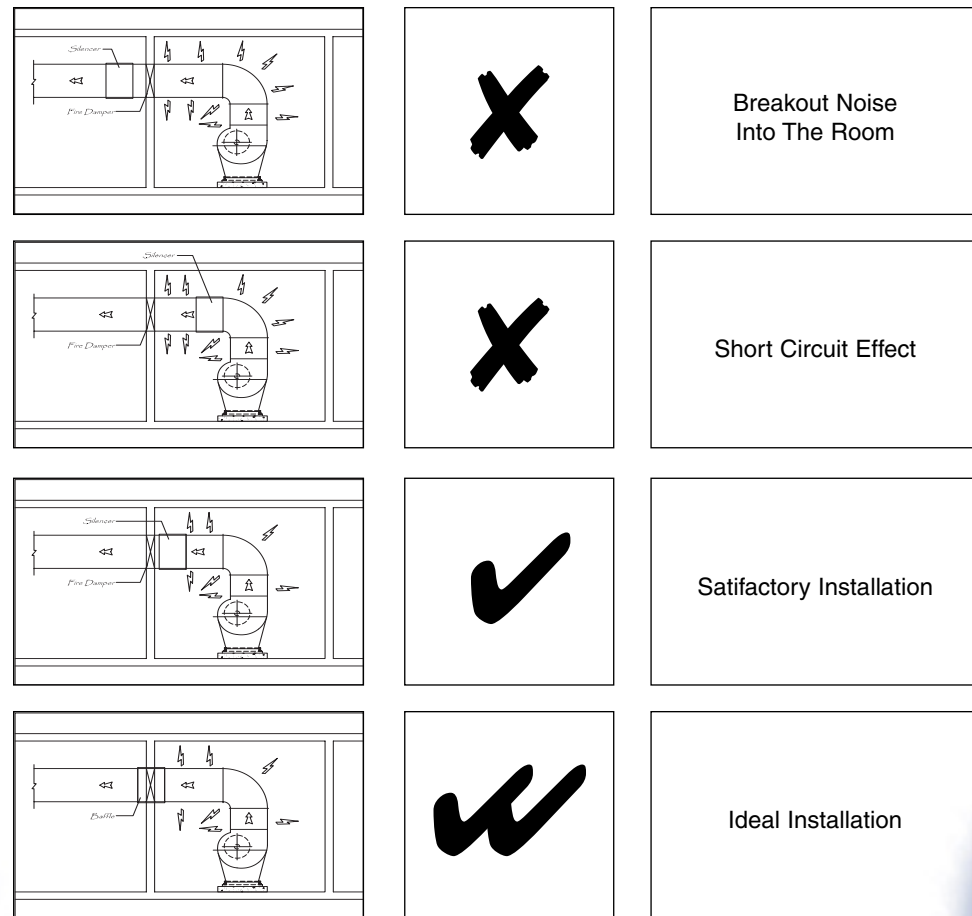
RECTANGULAR SILENCER





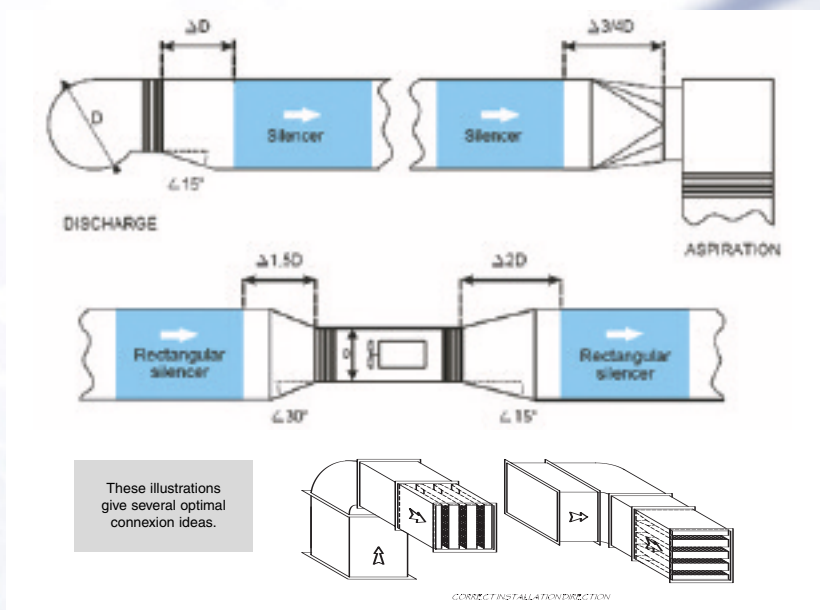
## Installation in an Air Duct System

The following illustration shown how to use our silencers in optimal conditions and obtain maximum effectiveness.



It is best to install the silencer close to the noise source to avoid breakout noise across the ducts. An incorrectly installed silencer can short circuit the noise travel path and reduce the acoustic performance.

We recommend that the rules of HVAC Systems Duct Design to be followed. Improper installation waste energy, increase pressure drop and create high re-generated noise.



## Selecting a BEL Rectangular Silencer

Selecting a silencer depends mainly on the noise band frequencies to attenuate and the acceptable pressure drop. If you require higher attenuation, the acoustic media must be thicker and/or the silencer must be longer. Follow the sample calculation sheet for HVAC silencer selection as below. It will help you choose your optimal silencer wisely.

### Noise Calculation Procedure:

The simplest calculation for attenuators is for downduct noise. This is, as it's name suggests, the level of noise transmitted down a duct system. The following summary gives the calculation procedure.

1. Find the fan sound power level,  $SWL_{(fan)}$ . The values for all octave bands.
2. Choose the worst duct run (normally the shortest), and calculate the attenuation  $A_1$  due to straight duct runs, bends or elbow.
3. Define the air grille/diffuser area and installation condition (flanged or unflanged), and calculate the attenuation  $A_2$  due to reflection of low frequencies at the air outlet or inlet.
4. The total sound power leaving the ductwork system (Sound Power Leaving,  $Lw_{(l)}$ ) is,

$$SWL_{(l)} = SWL_{(fan)} + A_1 + A_2$$

5. Calculate the reverberant sound pressure level,  $SPL_{(rev)}$  by correcting for the total % of flow to the chosen room,  $A_3$  [10log(%/100)] and find the corrections for room volume(V),  $A_4$  [10log(4/0.16V)] and reverberation time(t),  $A_5$  [10log(t)]. Allow for the number of systems(n) serving the room,  $A_6$  [10log(n)].

$$SPL_{(rev)} = SWL_{(l)} + A_3 + A_4 + A_5 + A_6$$

Remark : for noise calculation to outside building (open space), reverberant sound pressure level to be omitted.

6. Calculate the direct sound pressure level  $SPL_{(dir)}$  by correcting for the total % of flow to the nearest grille,  $A_7$  [10log(%/100)]. This is in general different to  $A_3$ . Find  $A_8$ , the correction from sound power to direct sound pressure level at a distance [10log(1/4 $\pi$ r<sup>2</sup>)] and  $A_9$  the correction for directivity.

$$SPL_{(dir)} = SWL_{(l)} - A_7 - A_8 - A_9$$

7. Combine the direct and reverberant levels to get the resultant sound pressure level  $SPL_{(tot)}$ . Use dB addition for combining the direct and reverberant levels.

8. Compare the  $SPL_{(tot)}$  in octave band (noise spectrum) with the design NC curve. The  $SPL_{(tot)}$  noise spectrum must be lower or equal to design NC curve, it means that the attenuation required,  $A_{10}$  should be 0. If not, a silencer should be selected (attenuation selected,  $A_{11}$ ) to overcome the attenuation required to ensure that the insufficient dB,  $A_{12}$  is 0.

9. Calculate the resultant sound pressure level with silencer (dBA) in octave band by adding the silencer attenuation,  $A_{11}$  and A-weighted factor. Combine the resultant sound pressure level with silencer in octave band to get the Overall Sound Pressure Level (dBA). Use dB addition for combining the octave band sound pressure level.

**BEL**

### DOWNDUCT CALCULATION SHEET

Date : 3/26/2007		Job Detail :		Location : Supply (Open office)																																																																																																																																																																																																																																																																																																																																																																									
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<b>Duct Attenuation :</b> <table border="1"> <tr> <th>Band or Duct</th> <th>Length (m)</th> <th>Size (in mm)</th> <th>Type or Treatment</th> <th>-2</th><th>-4</th><th>-7</th><th>-11</th><th>-16</th><th>-14</th><th>-11</th><th>-10</th> </tr> <tr> <td>Duct 1</td> <td>1000</td> <td>ø 450</td> <td>Lead Seal</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td>Duct 2</td> <td>1000</td> <td>ø 450</td> <td>Box Rectangular</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td>Duct 3</td> <td>2150</td> <td>ø 450</td> <td>Box</td> <td>-1</td><td>-2</td><td>-3</td><td>-3</td><td>-3</td><td>-3</td><td>-3</td><td>-3</td> </tr> <tr> <td>Duct 4</td> <td>2150</td> <td>ø 450</td> <td>Box Rectangular</td> <td>-1</td><td>-1</td><td>-1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td>Elbow 1</td> <td>850</td> <td>ø 315</td> <td>Box</td> <td>0</td><td>-5</td><td>-7</td><td>-4</td><td>-3</td><td>-3</td><td>-3</td><td>-3</td> </tr> <tr> <td>Bend 2</td> <td>450</td> <td>ø 315</td> <td>Box</td> <td>0</td><td>0</td><td>-2</td><td>-4</td><td>-4</td><td>-4</td><td>-4</td><td>-4</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>End Reflection</td> <td>0.180 sq.m</td> <td>Flanged</td> <td></td> <td>-9</td><td>-2</td><td>-1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td colspan="4">Sound Power Leaving</td> <td>88</td><td>83</td><td>79</td><td>71</td><td>61</td><td>56</td><td>57</td><td>55</td> </tr> <tr> <td colspan="4">Room Attenuation :</td> <td colspan="8"></td> </tr> <tr> <td colspan="4">% of Total Flow to Room</td> <td>100</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td colspan="4">Room Volume</td> <td>140</td><td>-28.2</td><td>-28.2</td><td>-28.2</td><td>-28.2</td><td>-28.2</td><td>-28.2</td><td>-28.2</td> </tr> <tr> <td colspan="4">Reverberation</td> <td>RT = 1</td><td>0.8</td><td>0.8</td><td>0.8</td><td>0.8</td><td>0.8</td><td>0.8</td><td>0.8</td> </tr> <tr> <td colspan="4">No. of Systems in Room</td> <td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td colspan="4">Reverberant Sound Pressure Level</td> <td>69</td><td>64</td><td>58</td><td>51</td><td>43</td><td>39</td><td>36</td><td>34</td> </tr> <tr> <td colspan="4">Flow to Diffuser</td> <td>5.50</td><td>-15</td><td>-15</td><td>-15</td><td>-15</td><td>-15</td><td>-15</td><td>-15</td> </tr> <tr> <td colspan="4">Distance to Listener</td> <td>1.5</td><td>-14.5</td><td>-14.5</td><td>-14.5</td><td>-14.5</td><td>-14.5</td><td>-14.5</td><td>-14.5</td> </tr> <tr> <td colspan="4">Directivity</td> <td>1</td><td>-2</td><td>0</td><td>7</td><td>8</td><td>9</td><td>9</td><td>9</td> </tr> <tr> <td colspan="4">Direct Sound Pressure Level</td> <td>66</td><td>62</td><td>55</td><td>51</td><td>43</td><td>39</td><td>36</td><td>34</td> </tr> <tr> <td colspan="4">Resultant Sound Pressure Level</td> <td>71</td><td>68</td><td>68</td><td>61</td><td>48</td><td>41</td><td>41</td><td>37</td> </tr> <tr> <td colspan="4">Less Design Criteria</td> <td>NC 40</td><td>68</td><td>65</td><td>54</td><td>51</td><td>48</td><td>47</td><td>47</td> </tr> <tr> <td colspan="4">Attenuation Required</td> <td></td><td>5</td><td>5</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td> </tr> <tr> <td colspan="4">Attenuation Selected</td> <td></td><td>5</td><td>18</td><td>19</td><td>27</td><td>31</td><td>29</td><td>21</td> </tr> <tr> <td colspan="4">Insufficient dB</td> <td></td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td colspan="4">Overall Sound Pressure Level</td> <td></td><td>43</td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td colspan="4">Model :</td> <td colspan="2">BEL</td> <td colspan="2">Series :</td> <td colspan="2">200</td> <td colspan="2">BELS 200-150</td> </tr> <tr> <td colspan="4">Dimensions (mm) :</td> <td colspan="2">1000 (W) x 450 (H) x 1500 (L)</td> <td colspan="2">Face velocity :</td> <td colspan="2">6.7 m/s</td> <td colspan="2">Fitting loss factor : 0.51</td> </tr> <tr> <td colspan="4">Pressure Drop :</td> <td colspan="2">25 Pa</td> <td colspan="2">Quantity :</td> <td colspan="2">1 nos.</td> <td colspan="2"></td> </tr> </table>						Band or Duct	Length (m)	Size (in mm)	Type or Treatment	-2	-4	-7	-11	-16	-14	-11	-10	Duct 1	1000	ø 450	Lead Seal	0	0	0	0	0	0	0	0	Duct 2	1000	ø 450	Box Rectangular	0	0	0	0	0	0	0	0	Duct 3	2150	ø 450	Box	-1	-2	-3	-3	-3	-3	-3	-3	Duct 4	2150	ø 450	Box Rectangular	-1	-1	-1	0	0	0	0	0	Elbow 1	850	ø 315	Box	0	-5	-7	-4	-3	-3	-3	-3	Bend 2	450	ø 315	Box	0	0	-2	-4	-4	-4	-4	-4																									End Reflection	0.180 sq.m	Flanged		-9	-2	-1	0	0	0	0	0	Sound Power Leaving				88	83	79	71	61	56	57	55	Room Attenuation :												% of Total Flow to Room				100	0	0	0	0	0	0	0	Room Volume				140	-28.2	-28.2	-28.2	-28.2	-28.2	-28.2	-28.2	Reverberation				RT = 1	0.8	0.8	0.8	0.8	0.8	0.8	0.8	No. of Systems in Room				1	0	0	0	0	0	0	0	Reverberant Sound Pressure Level				69	64	58	51	43	39	36	34	Flow to Diffuser				5.50	-15	-15	-15	-15	-15	-15	-15	Distance to Listener				1.5	-14.5	-14.5	-14.5	-14.5	-14.5	-14.5	-14.5	Directivity				1	-2	0	7	8	9	9	9	Direct Sound Pressure Level				66	62	55	51	43	39	36	34	Resultant Sound Pressure Level				71	68	68	61	48	41	41	37	Less Design Criteria				NC 40	68	65	54	51	48	47	47	Attenuation Required					5	5	3	3	3	3	3	Attenuation Selected					5	18	19	27	31	29	21	Insufficient dB					0	0	0	0	0	0	0	Overall Sound Pressure Level					43							Model :				BEL		Series :		200		BELS 200-150		Dimensions (mm) :				1000 (W) x 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Technical Specifications

Comparing the performance of the BEL line of rectangular silencers based on the different parameters (length, splitter width, airway width) will help you make the best choice.

[Type 200]

Type 200 Model	Octave Band Centre Frequency (Hz)								k-factor
	63	125	250	500	1K	2K	4K	8K	
BRS 75-600	4	7	13	29	39	27	26	18	2.75
BRS 75-900	5	10	18	33	42	32	28	20	3.27
BRS 75-1200	5	13	23	40	47	36	32	23	3.91
BRS 75-1500	6	16	28	45	53	42	33	24	4.16
BRS 75-1800	7	18	33	52	54	49	36	26	4.44
BRS 75-2100	9	21	38	56	57	55	38	28	4.97
BRS 75-2400	10	24	43	60	60	60	40	30	5.49
BRS 75-3000	11	28	48	60	60	60	43	32	6.40

Type 200 Model	Octave Band Centre Frequency (Hz)								k-factor
	63	125	250	500	1K	2K	4K	8K	
BRS 100-600	3	7	13	26	37	24	21	15	1.70
BRS 100-900	4	9	17	31	40	29	24	17	1.98
BRS 100-1200	5	11	21	36	45	33	26	19	2.16
BRS 100-1500	6	14	26	42	49	39	28	21	2.38
BRS 100-1800	6	16	31	48	53	45	31	23	2.77
BRS 100-2100	7	19	36	53	57	51	33	25	3.02
BRS 100-2400	8	21	41	57	60	56	35	26	3.27
BRS 100-3000	9	24	44	60	60	57	40	29	3.67

Type 200 Model	Octave Band Centre Frequency (Hz)								k-factor
	63	125	250	500	1K	2K	4K	8K	
BRS 125-600	3	6	11	24	31	20	17	12	0.99
BRS 125-900	4	8	16	29	35	25	19	14	1.19
BRS 125-1200	5	10	20	33	39	29	21	16	1.37
BRS 125-1500	6	13	25	39	44	33	23	18	1.48
BRS 125-1800	6	15	30	44	49	38	26	20	1.74
BRS 125-2100	7	17	36	51	53	48	28	22	1.91
BRS 125-2400	8	19	41	57	57	57	30	23	2.07
BRS 125-3000	9	22	44	60	60	54	34	26	2.38

Type 200 Model	Octave Band Centre Frequency (Hz)								k-factor
	63	125	250	500	1K	2K	4K	8K	
BRS 150-600	2	4	9	21	24	17	12	9	0.67
BRS 150-900	3	6	14	26	29	21	14	11	0.79
BRS 150-1200	4	8	18	30	33	24	16	13	0.92
BRS 150-1500	5	11	24	35	38	27	18	15	1.04
BRS 150-1800	5	14	30	40	44	31	20	17	1.11
BRS 150-2100	6	16	36	45	50	34	22	19	1.22
BRS 150-2400	7	18	41	49	55	37	24	20	1.32
BRS 150-3000	9	20	44	55	59	44	27	22	1.54

Type 200 Model	Octave Band Centre Frequency (Hz)								k-factor
	63	125	250	500	1K	2K	4K	8K	
BRS 175-600	2	4	9	19	21	15	10	7	0.46
BRS 175-900	3	6	13	23	26	18	12	9	0.55
BRS 175-1200	4	8	17	27	30	21	14	12	0.63
BRS 175-1500	5	10	22	31	35	24	16	13	0.71
BRS 175-1800	5	13	27	36	40	27	19	15	0.82
BRS 175-2100	6	15	32	41	45	30	22	17	0.89
BRS 175-2400	7	16	36	45	50	33	24	18	0.95
BRS 175-3000	8	19	38	49	54	39	27	20	1.11

Type 200 Model	Octave Band Centre Frequency (Hz)								k-factor
	63	125	250	500	1K	2K	4K	8K	
BRS 200-600	2	4	9	16	19	12	6	4	0.37
BRS 200-900	3	6	12	20	23	15	9	6	0.44
BRS 200-1200	4	8	15	23	27	17	12	10	0.50
BRS 200-1500	5	10	19	27	31	20	15	11	0.59
BRS 200-1800	5	11	23	32	36	23	18	12	0.61
BRS 200-2100	6	12	27	36	41	26	21	14	0.66
BRS 200-2400	6	13	30	40	45	29	24	16	0.71
BRS 200-3000	7	17	32	43	48	33	27	18	0.84

[Type 300]

Type 300 Model	Octave Band Centre Frequency (Hz)								k-factor
	63	125	250	500	1K	2K	4K	8K	
BRS 150-600	6	10	12	15	23	15	12	11	2.84
BRS 150-900	8	13	17	21	28	21	16	14	2.87
BRS 150-1200	9	16	23	27	31	27	21	16	2.91
BRS 150-1500	11	18	28	34	38	32	25	19	2.94
BRS 150-1800	12	21	32	39	44	35	29	21	2.97
BRS 150-2100	13	23	37	44	49	41	33	24	2.99
BRS 150-2400	14	24	42	48	53	46	36	26	3.01
BRS 150-3000	18	30	50	60	60	57	43	31	3.08

Type 300 Model	Octave Band Centre Frequency (Hz)								k-factor
	63	125	250	500	1K	2K	4K	8K	
BRS 200-600	6	10	9	21	24	12	13	13	1.66
BRS 200-900	7	12	14	26	28	17	15	14	1.68
BRS 200-1200	8	14	20	30	32	20	18	16	1.70
BRS 200-1500	9	16	23	35	36	25	20	18	1.72
BRS 200-1800	12	18	28	39	40	29	21	17	1.74
BRS 200-2100	13	20	32	44	45	33	24	19	1.76
BRS 200-2400	13	21	36	49	49	37	26	20	1.77
BRS 200-3000	14	25	47	55	55	45	30	22	1.79

Type 300 Model	Octave Band Centre Frequency (Hz)								k-factor
	63	125	250	500	1K	2K	4K	8K	
BRS 250-600	2	8	10	16	17	11	10	7	1.13
BRS 250-900	4	10	14	21	22	14	12	9	1.14
BRS 250-1200	5	12	19	26	23	18	15	10	1.17
BRS 250-1500	6	14	22	30	29	21	17	12	1.18
BRS 250-1800	8	16	25	35	34	23	19	12	1.19
BRS 250-2100	10	18	28	40	38	26	20	15	1.20
BRS 250-2400	11	20	30	45	42	28	21	17	1.20
BRS 250-3000	14	24	41	49	51	34	22	20	1.22

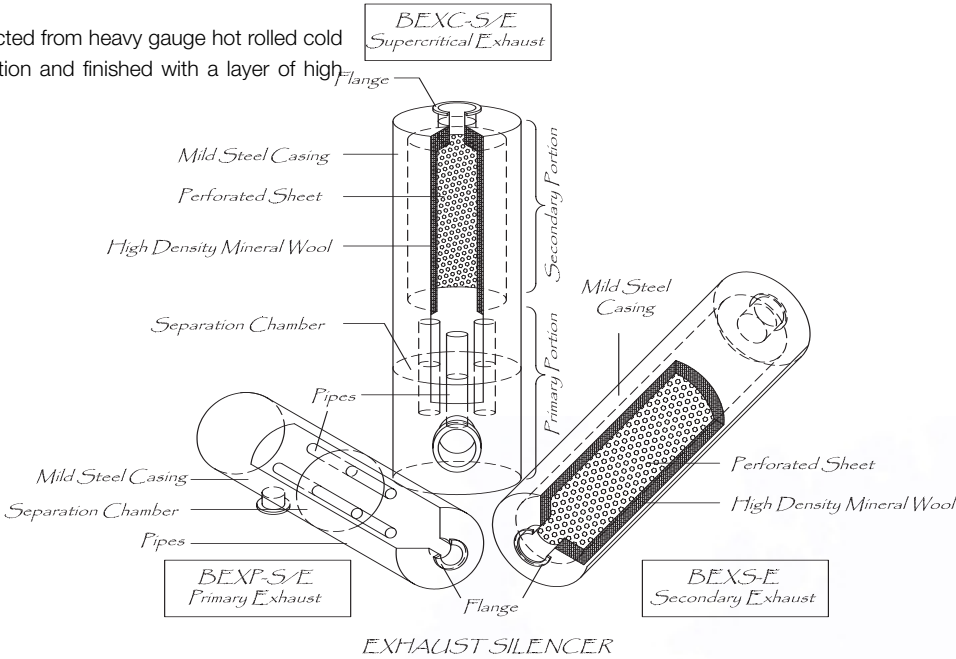
Type 300 Model	Octave Band Centre Frequency (Hz)								k-factor
	63	125	250	500	1K	2K	4K	8K	
BRS 300-600	2	5	9	12	9	10	10	9	0.81
BRS 300-900	3	7	13	16	14	12	11	10	0.82
BRS 300-1200	4	12	16	22	19	15	12	11	0.83
BRS 300-1500	5	13	20	27	24	17	15	12	0.83
BRS 300-1800	6	14	22	30	30	19	16	13	0.84
BRS 300-2100	8	16	26	35	36	23	17	14	0.85
BRS 300-2400	9	17	30	40	42	26	18	14	0.85
BRS 300-3000	12	20	35	42	45	27	19	16	0.86

BEL EXHAUST SILENCER

BEL NC manufactures and markets its exhaust silencers to provide you with design performance, product quality and customer satisfaction. These commitments are backed up by a promise of continual product development and the best support tools that will assist in improving your products and market position. BEL NC provides solutions which are manufactured in our own facilities, using advanced engineering tools that provide rapid, cost-effective results that protect your bottom line. Our extensive product line of standard and high performance exhaust systems means fast turn around even for your most challenging applications. Combining these product options with superior quality, competitive pricing, and responsive customer service makes BEL NC products your best choice.

Construction

Standard BEL Exhaust Silencers are constructed from heavy gauge hot rolled cold quenched steel sheet with welded construction and finished with a layer of high quality heat resistant paint.

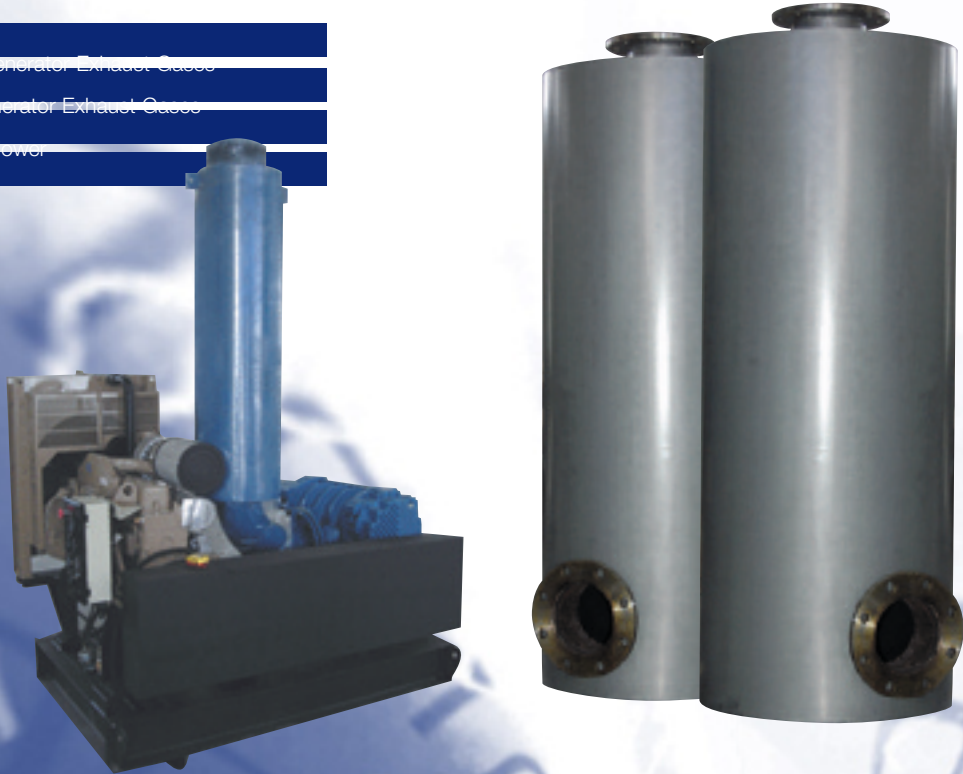


Application

Our exhaust silencers are designed to reduce noise mainly for the commercial and industrial sectors.

Application include:

- Diesel Engine Generator Exhaust Gases
- LPG Engine Generator Exhaust Gases
- High Pressure Blower
- Compressor etc.





Option

The options we offer will meet your needs and requirements:

- Silencer casing in mild steel, stainless steel or other material.
- Several thickness, minimum 2.0mm and above
- Water drain plug
- Lifting hooks
- Special flanges

Product Range

BEL Exhaust Silencers come in three different models:

• Multi-Chamber Reactive Type (Primary Silencer)

Model :   BEXP-S (side entry) &  
              BEXP-E (end entry)

BEL Primary silencers provide good attenuation at mid and low frequencies. They are available with side entry (BEXP-S) and end entry (BEXP-E). Oveall attenuation is approximately 30 dB.

• Straight Through Absorptive Type (Secondary Silencer)

Model :   BEXS-E (end entry)

BEL Secondary Silencers are connected in series with the primary silencers and provide effective attenuation over a broad range of frequency due to the presence of high temperature sound absorbing acoustic insulation inside the internal side of the silencer. Overall sound attenuation is approximately 20dB.

• Supercritical Type (Combination Type)

Model :   BEXC-S (side entry)  
              BEXC-E (end entry)

Supercritical Exhaust Silencer is a compact combination of reactive type and absorptive type exhaust silencer. Normally used when space is limited and noise criteria is not too stringent. Overall sound attenuation is approximately 35dB.

Silencer Attenuation (dB)

	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1K	2K	4K	8K
BEXP-S/E	20	25	30	31	29	26	21	18
BEXS-E	10	17	20	22	23	21	16	12
EXC-S/E	25	30	34	35	33	30	26	22

Silencer Dimension & Weight Data

Pipe Diameter, mm (A)	Overall Diameter, mm (B)	Overall Length side, mm (C)	Overall Length end, mm (C)	Overall Length, mm (D)	Offset,mm (E)	Weight (kg)
EXP-SE						
75	350	1000	1075	925	220	31
100	380	1215	1290	1140	230	55
125	450	1475	1550	1400	240	80
150	550	1600	1675	1525	250	125
200	660	1905	1980	1830	280	190
250	760	2440	2515	2365	330	320
300	915	2845	2920	2770	350	465
350	970	3125	3200	3050	400	640
400	1170	3725	3800	3650	450	815
450	1220	4075	4150	4000	500	1140
EXP-SE						
75	200	-	1075	925	-	15
100	225	-	1225	1075	-	27
125	250	-	1370	1220	-	35
150	380	-	1675	1525	-	60
200	450	-	1800	1650	-	80
250	550	-	1980	1830	-	115
300	650	-	2300	2200	-	180
350	750	-	2550	2400	-	250
400	775	-	2590	2440	-	330
450	830	-	2895	2745	-	420
EXC-S/E						
50	300	785	860	710	200	40
75	388	1000	1075	925	220	45
100	450	1215	1290	1140	230	70
125	500	1475	1550	1400	240	95
150	600	1600	1675	1525	250	140
200	750	1905	1980	1830	280	215
250	850	2440	2515	2365	330	365
300	970	2845	2920	2770	350	530
350	1120	3125	3200	3050	400	715
400	1270	3725	3800	3650	450	915

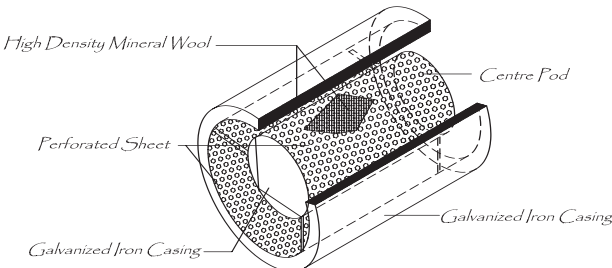
BEL CIRCULAR SILENCER

Construction

Standard Bel circular silencers are available in 4 basic models (BCS-1D, BCS-2D, BCSP-1D and BCSP-2D).

We vary the length or adding a centre acoustic pod for optimal acoustical performance (insertion loss). Other non-standard silencers can be designed and manufactured. Do not hesitate to contact us for more information.

Circular Silencer casing are made of galvanized steel with minimum thickness of 0.8mm (or 1.20mm galvanized steel for larger size). The acoustic media is made up of 60 kg/cu.m density rockwool with minimum 5% compression and protected by 0.5mm perforated galvanized steel.



CIRCULAR SILENCER

Application

Our silencers are designed to reduce noise mainly for the commercial and industrial sectors. Application include:

- Heat, Ventilation, Air-conditioning systems (HVAC),etc.
- Industrial stacks/chimneys
- Air inlet and outlet of equipment room couple with axial ventilation fan.
- Various situation to reduce indoor and outdoor noise pollution.
- All silencers air seal to sustain the high differential pressure.
- The acoustic media is assembled and welded inside the envelope with great precision to obtain an excellent concentricity and to minimize pressure drop.
- Standard 75mm and 100mm flange.

Option

The options we offer will meet your needs and requirements:

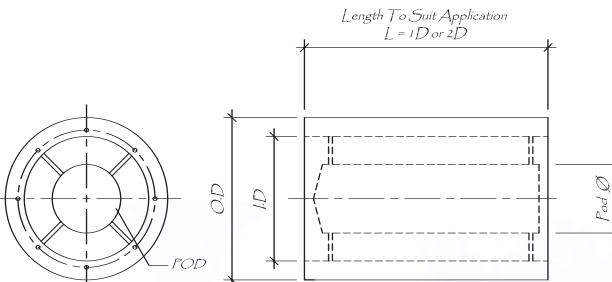
- Silencer casing in galvanized steel, stainless steel or other material.
- Several thickness, 0.8mm to 2.0mm and structural steel.
- Additional reinforcements (frame, angle iron, etc)
- Natural finish (galvanized or satin) and ordinary or special paint.
- Lifting hooks
- Water drain.
- Inspection door.

Acoustic Media

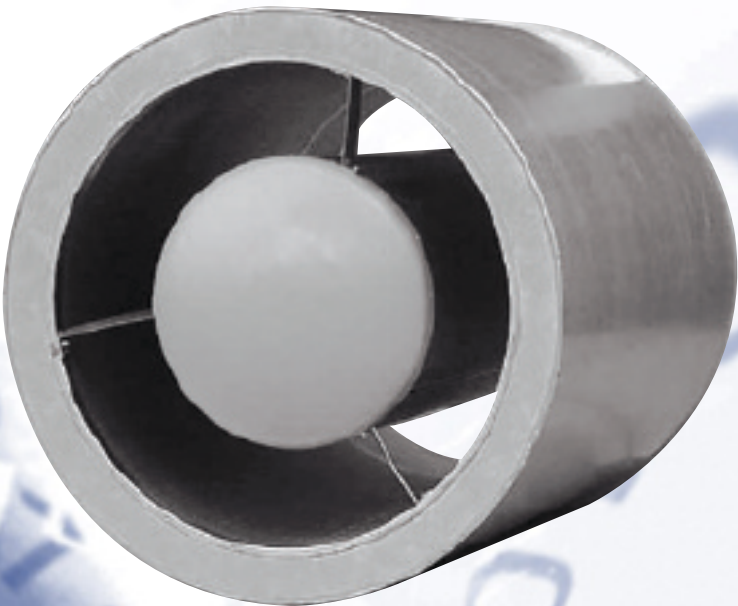
- Choice of acoustic media and density
- Acoustic media bagging using a polyester film to protect the media from oil, water, steam, bacteria, etc.
- Anti-erosion fiberglass cloth.
- Perforated sheet made of galvanized steel, stainless steel or other material.
- 0.4mm to 1.0mm perforated sheet.

Connecting Flanges

- Flanges to connect to the air duct system.



CIRCULAR SILENCER



# BEL ACOUSTIC DOOR

## Silencer Dimension Data

Flange ID (mm)	Casing OD (mm)	Shell Thickness (mm)	Length -1D (mm)	Length -2D (mm)	Pod Diameter (mm)
305	455	75	305	610	150
315	465	75	315	630	150
400	550	75	400	800	250
450	600	75	450	900	250
500	650	75	500	1000	300
560	710	75	560	1120	350
630	780	75	630	1260	350
710	860	75	710	1420	400
800	1000	100	800	1600	450
900	1100	100	900	1800	500
1000	1200	100	1000	2000	550
1120	1320	100	1120	2240	600
1250	1450	100	1250	2500	750
1400	1600	100	1400	2800	800

## Construction

Standard Bel Acoustic Door are constructed of heavy gauge steel sheet and filled with heavy acoustic infill. The “sandwich” multi-layer door leaves construction will maximize the acoustic door STC performance. All Bel Acoustic Doors are fitted with heavy duty hinges, in order to swing easily despite their weight. Stainless steel sill is provided against corrosion and water.

Door, frame, perimeter sound seals and door bottom are carefully aligned to minimize the air gap. Standard Bel Acoustic Doors are normally installed for grouting with concrete to form a solid foundation between the doors and building structure.

## Application

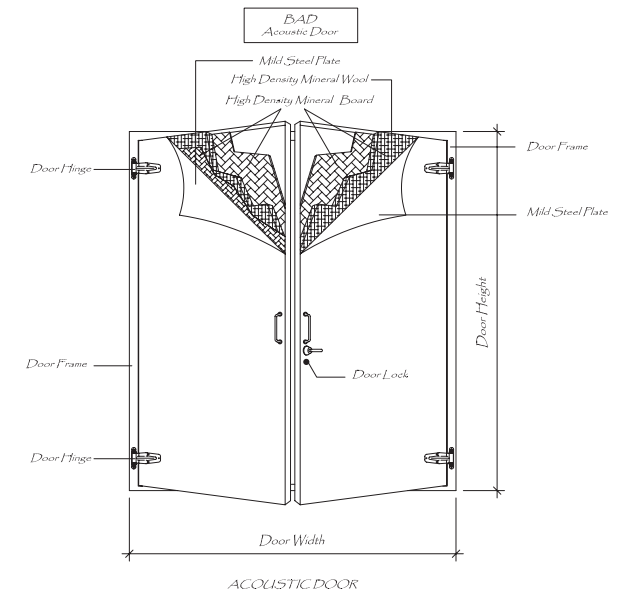
Bel Acoustic Doors are extensively used wherever it is necessary to isolate a quiet area from noisy environment:-

- Generator room
- Chiller plant room
- Boiler house
- Pump Room
- Acoustic Testing Laboratory such as Anechoic room, reverberation room etc.
- Various situation to reduce indoor and outdoor noise pollution.

## Option

The options we offer will meet your needs and requirements:

- Additional observation windows
- Mild steel, Galvanized steel or Stainless steel
- Additional heavy duty acoustic seal
- Natural finish (galvanized or satin) and ordinary or special paint.



## Silencer Insertion Loss (dB)

Silencer Internal Diameter (mm)		Octave Band Centre Frequency (Hz)								k-factor
		63	125	250	500	1K	2K	4K	8K	
305	BCS-1D	2	4	8	10	14	10	6	7	negligible
315	BCSP-1D	4	6	8	13	20	20	17	14	0.46
400										
450	BCS-2D	4	6	12	16	22	16	12	10	negligible
500	BCSP-2D	8	10	15	24	30	34	29	24	0.63
560										
630	BCS-1D	3	5	9	14	13	8	7	7	negligible
710	BCSP-1D	4	6	9	16	21	21	18	12	0.46
800										
	BCS-2D	4	7	14	22	21	16	12	11	negligible
	BCSP-2D	8	12	18	30	37	35	31	22	0.63
900	BCS-1D	3	5	9	15	14	9	8	7	negligible
1000	BCSP-1D	4	6	11	19	21	18	15	12	0.46
1120										
1250	BCS-2D	6	8	14	21	21	15	13	11	negligible
1400	BCSP-2D	8	12	19	30	34	30	21	16	0.63
1600	BCS-1D	4	5	10	16	13	9	8	6	negligible
1800	BCSP-1D	5	7	11	20	21	16	13	10	0.46
2000										
	BCS-2D	8	9	14	21	20	14	12	9	negligible
	BCSP-2D	9	13	21	27	28	27	18	15	0.63





Specificationon

Material	Door Leaf	Mild Steel / Galvanized Steel			
	Frame	Mild Steel / Galvanized Steel			
Model		BADS50 BADD50	BADS75 BADD75	BADS100 BADD100	BADS150 BADD150
Overall Dimension (mm)*	Single Leaf**	900W x 2100H			
		1200W x 2100H			
	Double Leaf**	1800W x 2100H			
		2400W x 2400H			
Approximate Weight		52 kg/sq.m	65 kg/sq.m	70 kg/sq.m	75 kg/sq.m

\* custom door size upon customer special request  
\*\* BADS for Single Leaf Door & BADD for DoubleLeaf Door

Frequency (Hz)	63	125	250	500	1K	2K	4K	8K	STC*
BAD50 (50mm)	15	25	36	40	39	38	40	40	38
BAD75 (75mm)	16	30	36	39	37	40	44	44	39
BAD100 (100mm)	19	30	37	41	44	48	48	45	42
BAD150 (150mm)	22	31	36	44	49	54	56	48	47

\* STC – Sound Transmission Class

BELACOUSTIC PANEL & ENCLOSURE

Construction

Standard Bel Acoustic Panel are available in basic 3 different thickness of 50mm, 75mm and 100mm with maximum width of 900mm and length available up to maximum of 2400mm for a single piece continuous panel. All panels are fabricated from heavy gauge galvanized/mild steel on external faces and perforated inner galvanized steel sheet retaining inert, fire resistance, vermin free sound absorbing material.

Standard Bel Acoustic Panel will provide noise reduction up to STC40. Our engineer will be able to design custom made acoustic panel for STC rating more than STC40.



Application

Bel Acoustic Panel can be used to fabricate acoustic enclosure for isolating noise emitted from industrial machine like:

- Diesel Engine
- Power Generator
- Pumps
- Compressor
- Ventilation fan, etc

Bel Acoustic Panels are designed to ease the assembly and dismantling with common hand tools. The enclosure can be fabricated to individual customer's specifications with no restriction on size.



Option

The options we offer will meet your special needs and requirements:

- Panel casing in galvanized steel, stainless steel or other material.
- Several thickness, 1.0 mm to 3.0mm and structural steel.
- Additional reinforcements (frame, angle iron, etc)
- Natural finish (galvanized or satin) and ordinary or special paint.
- Lifting hooks
- Double glazing observation windows
- Air exhaust fans
- Fresh air intake fans
- Air-conditioning units
- Lightings
- Electrical socket, etc.

Acoustic Media

- Choice of acoustic media and density
- Acoustic media bagging using a polyester film to protect the media from oil, water, steam, bacteria, etc.
- Anti-erosion fiberglass cloth.
- Perforated sheet made of galvanized steel, stainless steel or other material.
- 0.4mm to 1.0mm perforated sheet.

ABSORPTION COEEFICIENT								
Panel Thickness	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
50mm	0.18	0.33	0.45	0.96	0.84	0.80	0.65	0.62
100mm	0.37	0.70	0.92	0.95	0.95	0.94	0.77	0.76

TRANSMISSION LOSS (dB)								
Panel Thickness	Octave Band Centre Frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
50mm	10	16	20	30	40	50	55	58
100mm	15	21	25	35	44	46	50	56