

# Reciprocating Compressors Silencers

***VANEC***

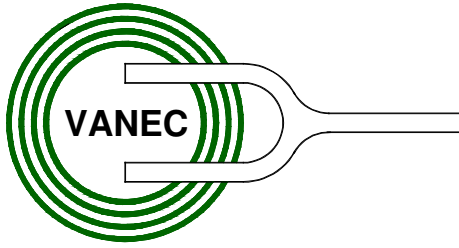
**Vanec Industrial Silencers**

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## RECIPROCATING COMPRESSOR INTAKE SILENCER APPLICATION DATA SHEET

|              |        |      |  |
|--------------|--------|------|--|
| Customer:    |        | RFQ: |  |
| Contact:     | Phone: | Fax: |  |
| Project Ref: | Email: |      |  |

### Reciprocating Compressor Data

|       |               |               |               |
|-------|---------------|---------------|---------------|
| Make: | <u>Model:</u> | HP:           |               |
| RPM:  | Bore:         | Stroke:       |               |
|       |               | Single Acting | Double Acting |

### Operating Conditions (please include units where applicable)

|  |            |                               |                                   |
|--|------------|-------------------------------|-----------------------------------|
| Air Intake Flow:                         | Air Temp.: | Barometric Pressure:          | Site Elevation:                   |
| *Unsilenced Intake Sound Power Level:    |            | dB re 10 <sup>-12</sup> watts |                                   |
| *Unsilenced Intake Sound Pressure Level: |            | dBA at                        | feet from compressor/filter inlet |

\*If available, please attach any unsilenced octave band noise data. This may be measured or predicted by the compressor manufacturer.

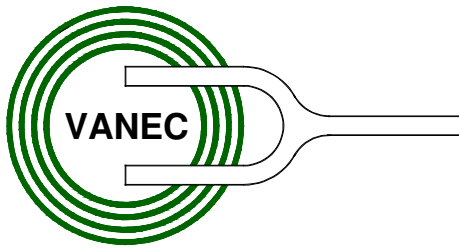
### Intake Silencer Performance Requirements

|   |        |                                 |
|---|--------|---------------------------------|
| Required Silenced Intake Noise Level:             | dBA at | feet from silencer/filter inlet |
| Maximum Allowable Intake Silencer™ Pressure Drop: | " w.c. |                                 |

### Intake Silencer Design Requirements

|                          |                     |                                |                |         |                  |
|--------------------------|---------------------|--------------------------------|----------------|---------|------------------|
| Shell Materials:         | Internal Materials: | Silencer Outlet Size & Rating: |                |         |                  |
| External Finish:         | Internal Finish:    |                                |                |         |                  |
| Wind Load:               | Seismic Load:       |                                |                |         |                  |
| Supports:                | Skirt & Base Ring   | Legs                           | Shell Brackets | Saddles | Other (specify): |
| Customer Specifications: |                     |                                |                |         |                  |
|                          |                     |                                |                |         |                  |
| Comments:                |                     |                                |                |         |                  |
|                          |                     |                                |                |         |                  |

**\*\* Please fax or Email completed data sheet to VANEC \*\***



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## Reciprocating Compressor Silencers

### Recommended Operating Velocities

(See Technical Section)

#### Intake Silencers

|               |                  |
|---------------|------------------|
| Single acting | 2000 to 3000 FPM |
| Double acting | 4000 to 5000 FPM |

### Pressure Drop Factors (PDF)

(See Technical Section)

|                |            |
|----------------|------------|
| <u>Model #</u> | <u>PDF</u> |
| 121            | 4.4        |

### Reciprocating Compressor Noise

Intake noise is predominantly low frequency. The frequency and amplitude is a function of size and speed of the compressor. Large bore, low speed reciprocating compressors will generate air-borne pulsation waves if unsilenced. This airborne pulsation may be perceivable at a considerable distance from the source.

The intake silencer size is determined by both intake slug – volume (swept volume of one cylinder), and flow velocity and allowable pressure drop.

$$\text{Intake Slug – volume} = \frac{(11)(B^2)(S)(VE\%)}{(4)(100)} = \text{cubic inches}$$

B = Cylinder Bore, Inlet

S = Stroke, inches

VE = Volume time efficiency  
 (Average VE = 85%)

ACFM is equal to the CFM of the compressor multiplied by the volumetric efficiency.

$$\text{ACFM} = \frac{(\mathbf{ID})(\mathbf{B}^2)(\mathbf{S})(\mathbf{N})(\mathbf{A})(\mathbf{RPM})(\mathbf{VE})}{(\mathbf{4})(\mathbf{1728})(\mathbf{100})}$$

RPM = Compressor Speed

N = Number of cylinders

A = Action, single acting = 1

Double acting = 2

The silencer size is determined by first calculating the slug – volume and then evaluating the velocity and pressure drop. The larger of the two is the preferred selection.

Silencer size

| <u>Model 121</u> | <u>(SV) Slug Volume</u> |
|------------------|-------------------------|
| 1"               | 33 in <sup>3</sup>      |
| 1½"              | 70 in <sup>3</sup>      |
| 2"               | 150 in <sup>3</sup>     |
| 2½"              | 245 in <sup>3</sup>     |
| 3"               | 340 in <sup>3</sup>     |
| 4"               | 750 in <sup>3</sup>     |
| 5"               | 1150 in <sup>3</sup>    |
| 6"               | 1750 in <sup>3</sup>    |
| 8"               | 3950 in <sup>3</sup>    |
| 10"              | 7600 in <sup>3</sup>    |
| 12"              | 11500 in <sup>3</sup>   |
| 14"              | 16000 in <sup>3</sup>   |
| 16"              | 23500 in <sup>3</sup>   |

The preferred slug volume ratio is 10 : 1 (Silencer Volume : Slug volume).

The silencer should be installed as close as possible to the compressor inlet (direct mount if possible).

If the pulse frequency (fundamental frequency or harmonies) couples with the piping natural mechanical a frequency resonant response (vibration) may develop. The intake silencer will act as an atmospheric pulsation control vessel and lessen this effect.