Push-pull Type Ventilation System

Solutions for creating safe working environments
Three features of push-pull ventilation

**Safety**
Emitted toxic substances flow into the exhaust hood before they can disperse, keeping them from contaminating the surrounding area.

**Workability**
Workability is maintained at the site since the system can be installed in an open space.

**Energy efficiency**
The system functions effectively with small motors since the air it supplies travels over a long distance.

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**Comparison of ventilation methods**

**Local exhaust (upward/side suction)**

- **Upward-suction local exhaust**
  \[ Q = 60 \times V \times (10 \times X^2 \times A) \]
  \[ = 60 \times 1.0 \times (10 \times 1^2 \times 1) \]
  \[ = 600 \text{m}^3/\text{min.} \text{ (15kW)} \]

- **Side-suction local exhaust**
  \[ Q = 60 \times V \times (10 \times X^2 \times A) \]
  \[ = 60 \times 0.5 \times (10 \times 1^2 \times 1) \]
  \[ = 300 \text{m}^3/\text{min.} \text{ (11kW)} \]

**Push-pull ventilation system**

Push-pull ventilation systems are more energy-efficient, allowing them to use smaller fans.

- **Push-pull ventilation system**
  \[ Q = 60 \times V \times A^2 \times 1.5 \]
  \[ = 60 \times 0.2 \times 1^2 \times 1.5 \]
  \[ = 18 \text{m}^3/\text{min.} \text{ (1.5 kW)} \times 2 \text{ units} \]
### System benefits

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement site</td>
<td>Motor winding factory</td>
<td>Motor winding factory</td>
</tr>
<tr>
<td>Measurement date</td>
<td>March 8, 2016</td>
<td>September 20, 2016</td>
</tr>
<tr>
<td>Measurement worksite</td>
<td>Varnish area</td>
<td>Varnish area</td>
</tr>
<tr>
<td>Name and management limit for measured substance</td>
<td>Styrene, 20 ppm</td>
<td>Styrene, 20 ppm</td>
</tr>
<tr>
<td>Measurement results (A) (geometric mean value)</td>
<td>$M_1 = 5.7 \text{ (ppm)}$</td>
<td>$M_1 = 5.3 \text{ (ppm)}$</td>
</tr>
<tr>
<td>Management category</td>
<td>II</td>
<td>I</td>
</tr>
<tr>
<td>Management results (B)</td>
<td>55 (ppm)</td>
<td>3.8 (ppm)</td>
</tr>
<tr>
<td>Management category</td>
<td>III</td>
<td>I</td>
</tr>
</tbody>
</table>

**Management category based on measurement location (A)**

- Measurements for 1 day

**Measurement results**

- **Styrene, 20 ppm**
  - Measurement results (A): $M_1 = 5.7 \text{ (ppm)}$
  - Measurement results (B): 55 (ppm)

**Measurement results**

- **Styrene, 20 ppm**
  - Measurement results (A): $M_1 = 5.3 \text{ (ppm)}$
  - Measurement results (B): 3.8 (ppm)
Push-pull type ventilation system components

1. Push hood
A three-stage design consisting of a punched metal plate, a honeycomb plate, and a pair of louvers supplies streamlined, straight-flowing air.

2. Pull hood
A pull hood ensures adequate exhaustion of streamlined air flowing from the supply side of the system.

3. Air supply fan
The system incorporates a high-efficiency turbo fan to ensure adequate airflow, even after accounting for duct pressure losses.

4. Exhaust fan
The system incorporates a high-efficiency turbo fan to ensure adequate airflow, even after accounting for duct pressure losses.

5. Control panel
The control panel incorporates an inverter so that the system can be adjusted to supply the necessary amount of airflow while operating on the minimum amount of power.

6. Ductwork
We can propose waste-free ductwork that is designed to maximize operability.

Specifications

<table>
<thead>
<tr>
<th>Model number</th>
<th>Hood dimensions (mm)</th>
<th>Duct diameter (ø)</th>
<th>Airflow (m³/min.)</th>
<th>Motor capacity (kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Width</td>
<td>Length</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal flow</td>
<td>PPH-0909</td>
<td>900</td>
<td>900</td>
<td>200</td>
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<tr>
<td></td>
<td>PPH-0912</td>
<td>1200</td>
<td>900</td>
<td>200</td>
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<tr>
<td></td>
<td>PPH-0915</td>
<td>1500</td>
<td>900</td>
<td>250</td>
</tr>
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<td>Downward flow</td>
<td>PPV-0909</td>
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<td>900</td>
<td>200</td>
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<td></td>
<td>PPV-0912</td>
<td>1200</td>
<td>900</td>
<td>200</td>
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<tr>
<td></td>
<td>PPV-0915</td>
<td>1500</td>
<td>900</td>
<td>250</td>
</tr>
</tbody>
</table>

*Prices are subject to modification depending on operating conditions at the customer's facility.
*Customer is responsible for installation work, duct materials, and shipping.

Options

- Activated carbon filter
- Fan stand
- Package-type horizontal system
- Package-type vertical system
- Troublesesa II Plus with data logger for 24-hour monitoring

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