The Milking Machine

Introduction

Airlines and Air Handling Components

Basic Air Handling Components

- The air handling system transports air to and from other parts of the milking machine.

**Main Components:**
- Main Airline
- Pulsator Airline
- Distribution Tank
- Interceptor

Let's look at how air and milk move through the machine

**Basic Components**

- **Airlines**
  - Move air from its point of entry into the milking machine to the vacuum pump where it is removed.

- **Airtanks**
  - Provide a convenient connection point for multiple air lines
  - Prevent milk and other liquids from entering the vacuum pump.
Airlines

There are 2 types of air lines within the Air Handling components:

- Main Airline
- Pulsator (sometimes with a filtered line)

Main Airline

- Transports ONLY air from the sanitary trap to the vacuum pump where it is removed from the system.
- MUST carry all the air entering the system to the vacuum pump with minimal vacuum drop (friction).
- Main airlines are considered Non-sanitary components of the milking machine.
- Maximum airflow rate occurs from the vacuum regulator to the vacuum pump.

Pulsator Airline

- Transports ONLY air from pulsation chambers and pulsator hoses to the distribution tank (if present) and on to the main airline.
- May transport air used from various vacuum-operated devices such as automatic milking unit detachers.
- Pulsator Airlines are also considered non-sanitary lines.
**Pulsator**

- Draws air in from the environment and admits it into the pulsation chamber of the milking units as the liners are closed.
- Air is drawn from the pulsation chamber into the pulsator air line as the liners are opened.

**Pulsator with Filtered Airline**

- Pulsators may also have a filtered airline attached to remove dust and other debris from the air entering the pulsators.
  - Keeps the pulsators and the rest of the air flow path clean.
  - Reduces pulsator maintenance and faults.
- It is important that the airline filters be cleaned regularly. If filters become full of dust and debris it can affect pulsators function.

**Filtered Air Line**

- Filtered air tube to pulsator from filtered air line
- Filtered air distribution line
- Air Filter

**Air Tanks**

- There are 2 types of air tanks within the air handling components of a milking system.
  - Distribution Tank
  - Interceptor
Distribution Air Tank

Acts as a manifold for the connection of airlines.
- The extra air volume supplied by the distribution tank has little effect on vacuum stability of modern milking systems.
- Filters out liquid and particles from air stream.
- There are no standards for distribution tank size.

Interceptor Air Tank

Captures debris and liquid (milk or wash water) before the vacuum pump.
- May be included instead of or in addition to a distribution tank.
- Usually mounted on the main airline near the vacuum pump.
- Drain at bottom to remove accumulated liquids.
- No size standards.
Sizing

Airline diameter is determined based on:

- Required length of pipe and the number of elbows and other fittings
- Vacuum Pump capacity
  - Maximum air flow through the airline
- Location of the vacuum controller

Performance Standards for Sizing Airlines

- **Main Airline**
  - Pump to receiver < 0.6" Hg (2 kPa) difference in average vacuum
  - Receiver to regulator < 0.2" Hg (0.75 kPa) difference in average vacuum
  - > 90% Regulation efficiency

- **Pulsator Airline**
  - Receiver to far end < 0.6" Hg (2 kPa) difference in average vacuum
  - Distribution tank and interceptor have no size standards.

Main Airline Size (Inches) - Use this to choose the size of the main airline (trap to vacuum pump)

<table>
<thead>
<tr>
<th>Vacuum Pump CFM</th>
<th>Feet of Pipe</th>
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Pulsator Airline Sizing

Minimum Sizes for Vacuum Pulsator Lines(s) for Pipeline Milking Systems

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<tr>
<th>Number of Units</th>
<th>Pipe Size</th>
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<tr>
<td>1-14</td>
<td>2 inches (48 mm)</td>
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<td>15 or more</td>
<td>3 inches (73 mm)</td>
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