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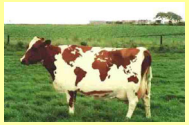
THE UNIVERSITY OF MELBOURNE

mpta

The Dairy Group
formerly the ADAS Dairy Group

MilkTech International



The Milking Machine

Introduction
Airlines and Air Handling Components

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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

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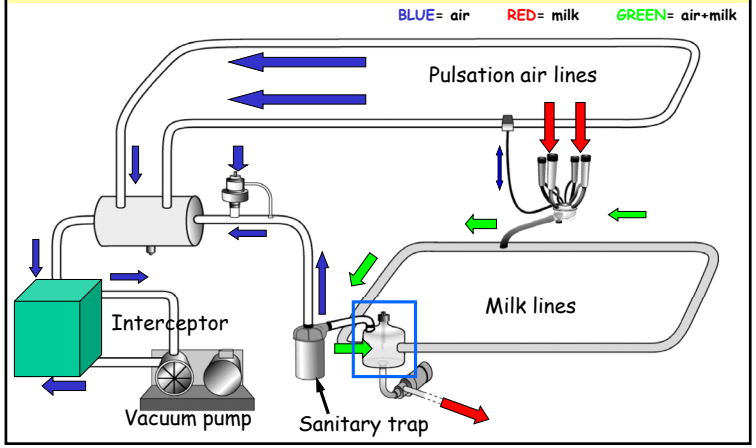
Let's look at how air and milk move through the machine



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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.

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Airlines

- There are 2 types of air lines within the Air Handing components:
  - Main Airline
  - Pulsator (sometimes with a filtered line)

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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.

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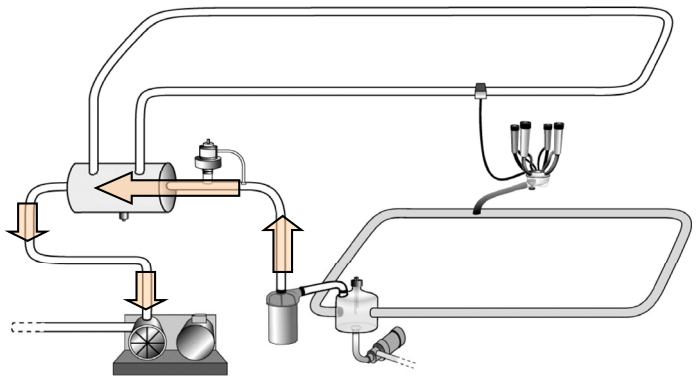
Main Airline: From the sanitary trap to the vacuum pump



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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.

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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.

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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.

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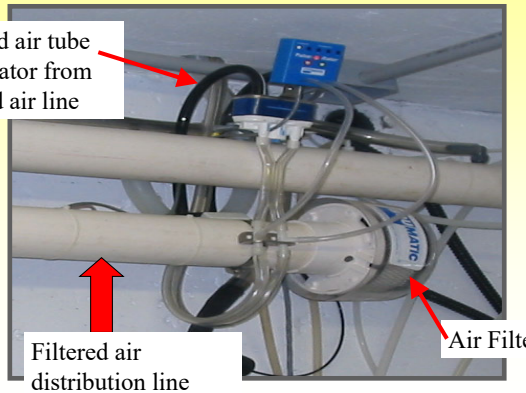
Filtered Air Line



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Air Tanks

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

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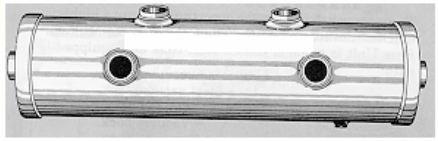
Distribution Air Tank

- 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.



TYPICAL HORIZONTAL DISTRIBUTION TANK

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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.

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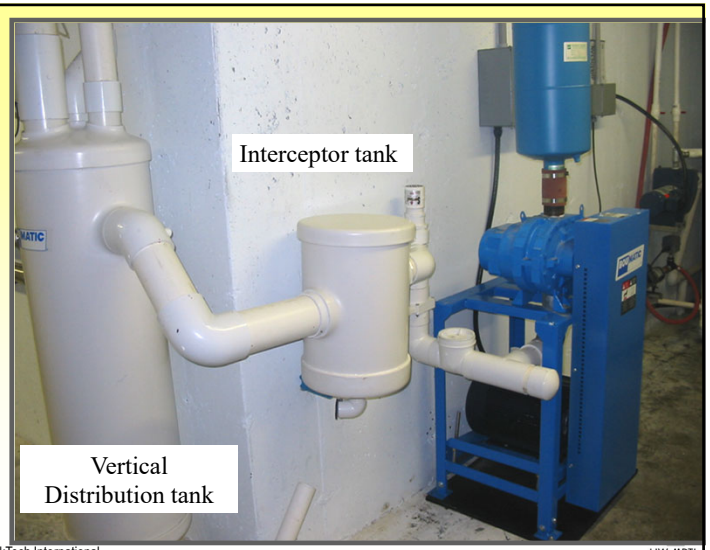

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Sizing

- 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

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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.

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Main Airline Size (Inches) – Use this to choose the size of the main air line (trap to vacuum pump)

Vacuum Pump CFM	Feet of Pipe 10	20	40	60	80	100	200
50	2	3	3	3	3	3	
70	3	3	3	3	3	3	
100	3	3	3	4	4	4	
150	4	4	4	4	4	4	
200	4	4	4	4	6	6	
250	4	6	6	6	6	6	
300	6	6	6	6	6	6	
400	6	6	6	6	6	6	

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Pulsator Airline Sizing

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

Number of Units	Pipe Size
1-14	2 inches (48 mm)
15 or more	3 inches (73 mm)

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