LEV Integrated with Mechanical Covers to Achieve Energy Savings

Exhaust Systems for Open Surface Tanks

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KCH Engineered Systems
Pollution Control Exhaust Systems
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Chemical Process Tanks

- Anodizing (Sulfuric Acid)
- Electropolishing (Sulfuric/Phosphoric)
- Electrocleaning (Sodium Hydroxide)
- Brightening (Nitric/Phosphoric)
- Precleaning (Sodium Hydroxide)
- Etching (Nitric/HF)
- Electroplating (Copper, Nickel, Chrome, etc.)
Method for control:

LOCAL EXHAUST VENTILATION
Proper exhaust rates for Open Surface Tanks can vary

50 CFM/ft² -- 250 CFM/ft²
Factors affecting chemical emissions in process tanks.

- Type of process solution.
- Concentration of chemicals in the tank.
- Amount of exposed surface area to open air.
- Electrification of the solution in the tank.
- Operating temperature
- Vapor Pressure of the liquid
- Part agitation (air v/s eductor)
Typical Hard chrome plating tanks

Chrome Plating Surface Area

Copper Bussing
Hard Chrome Plating Tank
20,000 AMPS
DIRECT CURRENT
Mechanical Tank covers

- Trash Can Covers and Coffee Cup Lids.
- The substances evaporate from the surface of the tank, then condense on the inside of the cover, and eventually drip back into the tank.
Advantages of a Covered Tank

- Reduce overall exhaust requirements
- Reduces fugitive emissions
- Reduces heat loss and evaporation rates
- Reduces energy consumption
- Reduces calculated surface area for exhaust rates.
Tank Cover Design

- **Must NOT be removable.**
  - Employees will permanently leave them off.

- **Mechanical Operation**
  - Single Hinged, Double Hinged or Double Covers
  - Actuators for movement

- **Movement Control**
  - Manual Push Button
  - Automatic

- **Material Selection**
  - Stainless Steel
  - Polypropylene
LATERAL EXHAUST HOODS
DESIGNED TO BE LOW PROFILE
Utilities routed below rim of tank
Integrating covers with the exhaust system

- Limit switches are installed to indicate whether the covers are in the complete up or down position.
- PLC control to direct operation and interlock with fan or damper controls.
- Exhaust rate adjustment based on position of the covers.
Principle of automatic covered tank ventilation
Case Study of Energy Savings

- EPA – Environmental Technology Verification Program (ETV)
- Evaluated a Chemical Etch Line utilizing mechanical covers
- Compared operational cost to traditional line without covered tanks
- $62,978 annual operational cost savings

http://www.epa.gov/etv/verifications/vcenter6-12.htm
Variable Frequency Drives to achieve Energy Savings

- VFDs used with a PLC to ramp the system up and down, based on cover position.
- Adjust the Hertz and RPM of the motor.
- More affordable due to maturing technology
- Many tanks are only accessed a few times daily.
- Exhaust Requirements for cover tanks are much lower.
Covers integrated with LEV
Thank You!

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