Food Safety Practices for HVAC and Refrigeration Systems

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PURPOSE

- Define Areas of Impact
- Challenges & Root Cause
- Best Practice Solution
- Impact in Your Operation
- Questions
Critical Parameters for Food Protection in HVAC & Refrigeration

- Temperature
- Relative Humidity
- Airborne contamination
Facilities

- Food processing facilities
- Food storage & distribution facilities
- Retail facilities
AREAS IMPACTED
Food Processing

- Hanging Evaporator
- Ductwork
- Roof Top Unit
- Freezers

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CHALLENGES

Food Processing

- Temperature control
  - Different set point in each area
  - Process areas
  - Packaging areas
  - Warehouse areas
  - Shipping areas
CHALLENGES

Food Processing

Humidity Control
- Condensate dripping onto product
- Increases microbiological growth
- Interferes with production
  - Labeling
  - Dry product processing
  - Product mobility system
CHALLENGES

Food Processing

Airborne contamination
- Microbiological contamination
  - Ductwork
  - Facility surfaces

- Particle contamination
  - Microbiological food source
  - Heat transfer contaminant
AREAS IMPACTED

Food Storage & Distribution

- Hanging Evaporator
- Roof Top Unit
- Freezers

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CHALLENGES
Food Storage & Distribution

Temperature control
– Different set point in each area
– Warehouse areas
– Shipping areas
CHALLENGES

Food Storage & Distribution

Humidity Control
– Condensate dripping onto product
– Damaging cardboard boxes
– Safety from wet floors
**CHALLENGES**

**Food Storage & Distribution**

- Airborne contamination
  - Particle contamination
    - Heat transfer contaminant
AREAS IMPACTED

Retail

Freezers

Coolers
CHALLENGES

Retail

Temperature control
– Maintaining set point in each area
– Energy use increases
ROOT CAUSES

Processing, Warehousing, Distribution, Retail

- Insufficient coil maintenance program
  - Cleaning practices
  - Cleaning frequencies
ROOT CAUSES

Cleaning Practices & Frequencies:

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ROOT CAUSES

Cleaning Practices & Frequencies:

- Current cleaning practices are not sufficient to keep the evaporators clean

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ROOT CAUSES
Processing, Warehousing, Distribution, Retail

- Inadequate air filtration program
  - Filter efficiency
  - Change-out frequency
ROOT CAUSES
Processing, Warehousing, Distribution, Retail

By-pass

MERV 8 & 3 month life
ROOT CAUSES

Processing, Warehousing, Distribution, Retail

Inadequate air filtration program

- Manpower requirements

- Increased costs

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ROOT CAUSES

Processing, Warehousing, Distribution

▲ Deficient duct cleaning program
  – Poor cleaning process
  – Frequency
BEST PRACTICE SOLUTION

Design a program that …

– Meets the indoor environment standards
– Supports the maintenance needs of the facility
– Optimizes efficiency, saving energy
BEST PRACTICE APPROACH TO HVAC/REFRIGERATION EFFICIENCY

- Restore efficiency of coils
  - Deep clean coils with effective cleaning process
- Keep coils clean to promote safe food environment and maintain efficiency
  - Use state-of-the-art air filtration
- Measure improvement gains
  - Benchmark and manage safety and performance protocols
PROGRAM DESIGN

- Coil cleaning process
- Air filtration
- Duct cleaning program
- Monitoring improvements
DEEP CLEANING PROCESS

Recover Coil Heat Transfer Performance

COIL-FLO versus Standard Cleaning Method

COIL-FLO has a targeted, low psi water flow for deeper, thorough cleaning without damaging fins.

Standard cleaning methods often push debris further into coils, blocking airflow.

Complete Penetration

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FIND A CLEANING PROCESS

Fully penetrates coil & removes soils

Complete Coil Penetration—Unmatched Cleaning Results

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RESULTS

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BEST PRACTICE
FILTRATION APPROACH

Step 3: Engineer a filter solution

Step 2: Identify end user’s improvement goals

Step 1: Understand...
- Customer’s system requirements
- Mechanics of Refrigeration system
- Operation of Refrigeration system
- Performance of Refrigeration system

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ENERGY REDUCTION & MANPOWER UTILIZATION

Pressure Drop Across the Filter

Energy Cost

Waste 75% Reduction

Pressure Drop Curve - Inefficient Filter
Pressure Drop Curve - Efficient Filter
Savings Potential

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DUCT CLEANING PROGRAM

- National Air Duct Cleaning Association (NADCA) cleaning standards
  - National standard
  - Methodical process to insure proper cleaning
- NADCA certified crews
- Design program to meet your specific need
MONITORING GOALS

- Measure and document system improvements
  - Coil cleaning and efficiency improvement impact
  - Filter upgrade impact
  - Duct cleaning impact

- Manage food safety & performance life cycle with on-going monitoring

- Predict optimum time to change filters, clean coils and clean ducts to protect food process
ENERGY MONITORING

Fan Energy Reduction
AHU - AMP Draw Evaluation Variable Speed Drive

Installation of Nalco Filter Solution
COIL-FLO Cleaning

Average Payback Period 9 Months
19 kWh Saved/$ Spent

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BEST PRACTICE PROGRAM DELIVERS …

Food Safety
- Prevents food contamination (from evaporators & ducts)
- Prevent condensate drips onto food
- Easier control of room temperatures

Total Cost of Operation Reduction
- Energy reduction
- Material reduction
- Asset reliability and preservation
- Manpower utilization
- Waste reduction

Sustainable Savings (on-going savings)
Questions?