Canned Motor Pumps

Installation
Operation
Maintenance

In

Refrigeration Services

Presented by:
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Typical Pump Internals

- Centrifugal Pump
- Single Stage
- Enclosed Impeller
- Stator & Rotor “Canned”
- True Secondary Containment
- Product Lubricated & Cooled Motor
- Carbon Sleeve Bearings
- 304 SS w/ Hard Chrome Sleeves
- Thrust Collars
Typical Centrifugal Pump Performance Curve
System Head Curve
NPSH - Net Positive Suction Head
Available vs. Required

NPSHa is sufficient to avoid cavitation

NPSHa is too low; cavitation will occur
Recommended Piping Arrangement

Reverse Circulation Piping Notes:

1) Continuously rising
2) Connect line to vapor space in suction vessel
3) No check valves
4) No connection to other lines
Typical Suction Piping

- Eccentric Reducer
- Flat Side on Top
- 5 to 10 x Diameter
- Straight Run Recommended
Incorrect Suction Piping
Canned Motor Pump Design Features

- Product Lubricated & Cooled
- Hydro-Dynamic Bearing Design
- True Secondary Containment
- No Alignment Required
- No Mechanical Seal
- Bearing Wear Monitoring
- Direction of Rotation Indicator
Reverse Circulation Flow Path
Cautions & Warnings

- Wait for frost to form on motor before starting pump
- Wait at least five (5) minutes between starts
- Do not start or operate pump without liquid
- Do not cavitate pump
- Do not operate pump with forward flow fully shut off for more than thirty (30 seconds)
- Check bearing wear monitor regularly
Initial Priming Procedure

1) Inspect Installation
2) Open Suction Valve 100%
3) Open Discharge Valve 100%
4) Open Reverse Circulation Valve 100%
5) Open Minimum Flow Valve 100%
6) Let Pump fill with liquid for Ten (10) minutes or until a layer of frost covers the motor
Rotation Check
Manufacturer Supplied Device

1) Pump must be primed
2) Open Suction Valve 100%
3) Close Discharge Valve to 20% Open
4) Start Pump
5) Check manufacturer supplied device to verify correct direction of rotation
6) If direction of rotation is incorrect swap two motor leads and repeat check
Rotation Check
Using Pressure & Amps

1. Pump Must be Primed
2. Open Suction Valve 100%
3. Open Discharge Valve to 20% Open
4. Start Pump – Record Pressure & Amps
5. Swap Two of the Motor Lead Wires
6. Start Pump – Record Pressure & Amps
7. Compare the Readings Between Steps 4 & 6
   The higher readings is the correct rotation
8. Wire the Motor Accordingly
Start Up Procedure

1. Pump Must be Primed and Rotation Checked
2. Open Suction Valve 100%
3. Open Discharge Valve 20%
4. Open Reverse Circulation Valve 100%
5. Open Minimum Flow Valve to Required %
6. Start Pump
7. Gradually Open Discharge Valve Until Specified Capacity is Achieved
Checks During Operation

- Verify Motor Amps are Correct
- Verify Discharge Pressure is Correct
- Verify Bearing Monitor is Functioning
- Verify Pump Operating Properly Without Excessive or Abnormal Noise or Vibrations
Common Pump Problems

OIL IN THE SYSTEM

- Cold oil will solidify and plug vent lines
- Oil will cause the motor horsepower to go up since oil is more dense and viscous than refrigerant at low temperatures
- Motor will overheat or overload
Common Pump Problems

Rapid pressure drops in the suction vessel
Common Pump Problems

CAVITATION

- Decrease the flow rate of the pump
- Raise the liquid level in the vessel
  - For pumps, the higher the better
  - More important to keep the level as steady as possible
- Raise the tank elevation above the pump
- Minimize friction in the suction line
- Adjust Compressor Loading & Unloading
Daily Pump Maintenance

- Monitor suction and discharge pressure gauges
- Check pump monitoring devices
  - Motor Amperage – Is it between minimum and full load?
  - Bearing Wear Monitors – Are they in the green level?
- Watch for excessive noise and/or vibrations
  - Find and correct cause
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