

Overview of ANSI/IIAR 6-2019

Standard for Inspection, Testing, and
Maintenance of Closed-Circuit
Ammonia Refrigeration Systems

Presented by: Peter Thomas, P.E.



WHY
STANDARD
6?





ITM

Inspection, Testing, and Maintenance

History of IIAR 6

Bulletin No. 109 10/97

Guidelines for:

IIAR Minimum
Safety Criteria for
a Safe Ammonia
Refrigeration
System

International Institute of
Ammonia Refrigeration
iiar®

Bulletin No. 110 3/93

Guidelines for:

Start-up, Inspection
and Maintenance of
Ammonia Mechanical
Refrigerating Systems

International Institute of
Ammonia Refrigeration
iiar®

Bulletin No. 116 10/92

Guidelines for:

Avoiding Component
Failure in Industrial
Refrigeration Systems
Caked by Abnormal
Pressure or Shock

International Institute of
Ammonia Refrigeration
iiar®



Ammonia Refrigeration Safety Inspection Checklist

ID Number: _____

PRESSURE VESSELS

Plant Owner: _____
Address: _____
Contact: _____ Telephone: _____
Inspector: _____ Date: _____

Pressure Vessel

Vessel Location: _____
Vessel Identification Mark/No.: _____

Application

High Pressure Receiver Receiver Accumulator Oil Drift
 Pump Receiver Low Temp Pump Receiver High Temp Other (Describe): _____

Application Data

Normal Operating Pressure (psig): _____ Temperature (°F): _____
Vessel Size (Dia. x Ht. ft.): _____ Weight (approx. Lbs.): _____
Normal Ammonia Inventory (cu ft.): _____
Design Capacity (Specify Atmospheric Surge Vol. (ft³)): _____

Vessel Nameplate Data

Manufacturer Name, Model, Serial No.: _____
Year Manufactured: _____ Max. Design Working Pressure (psig): _____
Maximum Allowable Pressure (psig): _____ At (°F): _____
Minimum Design Metal Temperature (°F): _____ At (psig): _____
Test Pressure Applied (psig): _____

Safety Relief Valve Data

Type: Dual Single None
Manufacturer Name, Model, Serial No.: _____
Year Manufactured or Recalibrated: _____ ASME Seal Unbroken? Yes No
Pressure Setting (psig): _____ Capacity (cu. ft./min): _____
Wave Connections: Inlet _____ Outlet _____ Pipe Size: Inlet _____ Outlet _____
Is Valve Properly Insulated and Pinned to Service? Yes No

Visual Liquid Level Indicator

Inuse Not Activated Ammonia Storage High Pressure Indicator None

Minimum Safety Criteria for a Safe Ammonia Refrigeration System

Requirement/Commentation	Confirms	Recommended Action/Comments	Safety Status	Target Date
a) Nameplate legible and complete?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
b) Operating within limitations				
1) Maximum pressure?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
2) Minimum temperature?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
c) Vessel ASME stamp legible?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
d) Certification stamp on file?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
e) Manufacturer data report on file?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
f) Data report has been reviewed/initialled?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
g) If yes, was review completed?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
h) Is technical data report on file?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
i) Relief valve				
1) Proper type?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
2) Correct setting?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
3) Capacity correct?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
4) Installation correct?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
5) Pinned to service correct?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
6) Seal weld, threads or installation service tag in place at service?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
7) ASME seal unbroken?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
h) Safety interlock liquid level indicator (light/glass)				
1) Properly rated traffic indicator?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
2) Not "gapped"?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
3) Interlock device tested annual?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
4) Visual properly installed? (Name, pressure, level per ASME Section VIII)	<input type="checkbox"/> Yes <input type="checkbox"/> No			
5) Water column (check and):	<input type="checkbox"/> No water column <input type="checkbox"/> Sight water column <input type="checkbox"/> Remote column <input type="checkbox"/> Underdrain (check and)			
6) Inlet water column (check and):	<input type="checkbox"/> No sight water column <input type="checkbox"/> Sight sight water column <input type="checkbox"/> Remote sight water column <input type="checkbox"/> No float			
7) Outlet water column (check and):	<input type="checkbox"/> Sight, no water column <input type="checkbox"/> Sight remote column <input type="checkbox"/> Remote column			

Are there any other conditions that might negatively affect safe vessel operation? Yes No
If yes, describe: _____

Guidelines for:

IIAR Minimum Safety Criteria for a Safe Ammonia Refrigeration System

International Institute of Ammonia Refrigeration



Guidelines for:
**Start-up, Inspection
and Maintenance of
Ammonia Mechanical
Refrigerating Systems**

Revision to Bulletin 110

(Approved by IIAR Board of Directors June 19, 2007)

6.6.3 Pressure Relief Devices

Pressure-relief devices are generally one of two types: rupture discs or spring-loaded valves. Rupture discs are membranes that open at a set pressure and cannot reseal. Once ruptured, these devices must be replaced.

Spring-loaded relief valves open to relieve pressure when a set pressure is exceeded. After opening, these valves are designed to re-seat when pressure in the protected component drops below the valve's closing pressure. If a spring-loaded relief valve opens, the valve shall be replaced or recertified in a safe and timely manner. If re-seating is not complete, the valve shall be taken out of service immediately.

Relief valve vent lines shall be visually inspected annually to ensure that the vent line piping is intact and that vent outlets terminated to atmosphere are unobstructed and piped to prevent foreign matter from entering the vent line piping. If equipped, drip pockets shall be checked for water accumulation.

Pressure relief devices shall be replaced or recertified in accordance with one of these three options:

- 1) Every five (5) years from the date of installation.

IIAR originally recommended (in 1978) that pressure relief valves be replaced every five years from the date of installation. This recommendation represents good engineering practice considering the design and performance of pressure relief devices; or

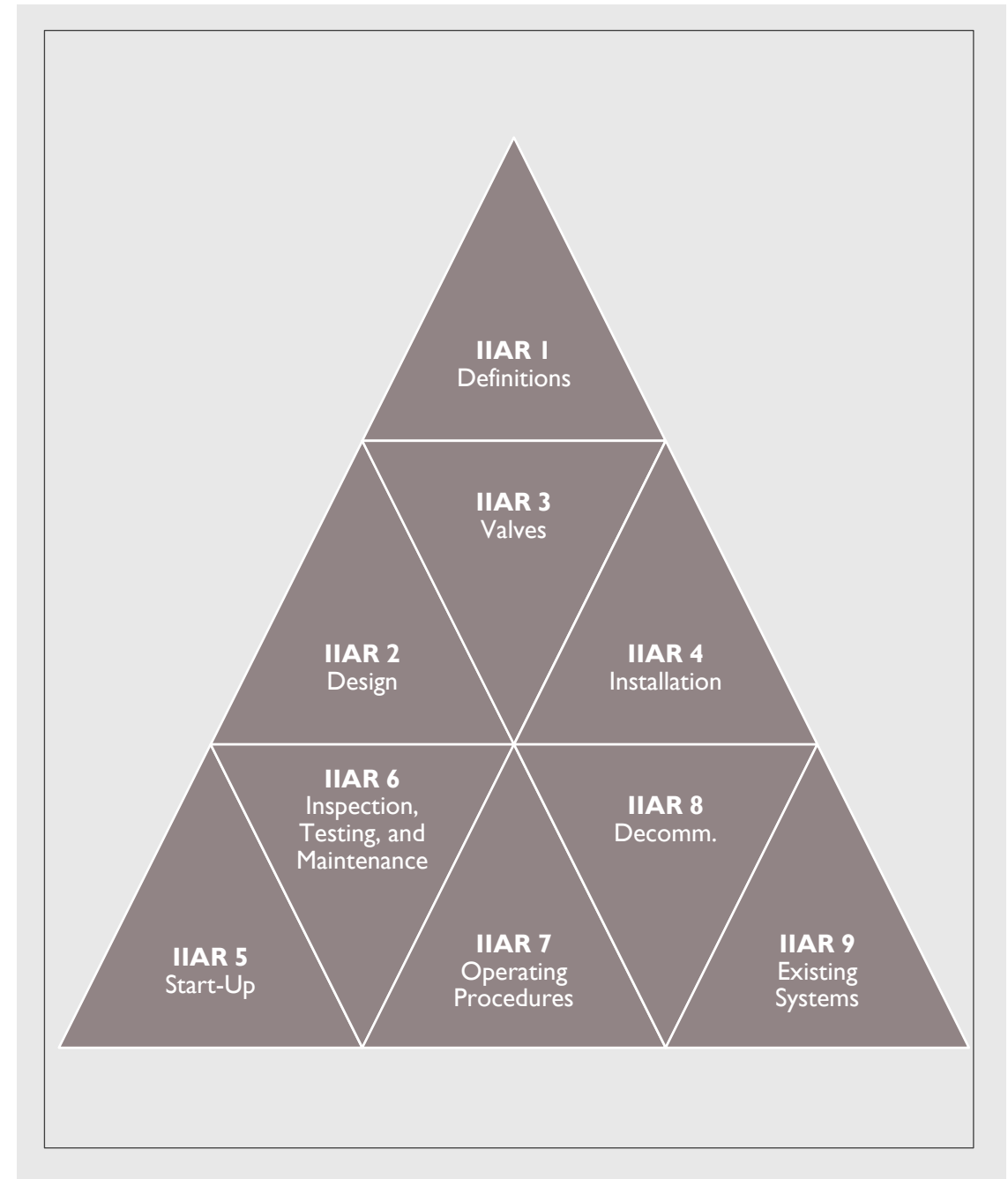
- 2) An alternative to the prescriptive replacement interval, i.e., five years, can be developed based on documented in-service relief valve life for specific applications using industry accepted good practices of relief valve evaluation; or
- 3) The manufacturer's recommendations on replacement frequency of pressure relief devices shall be followed.

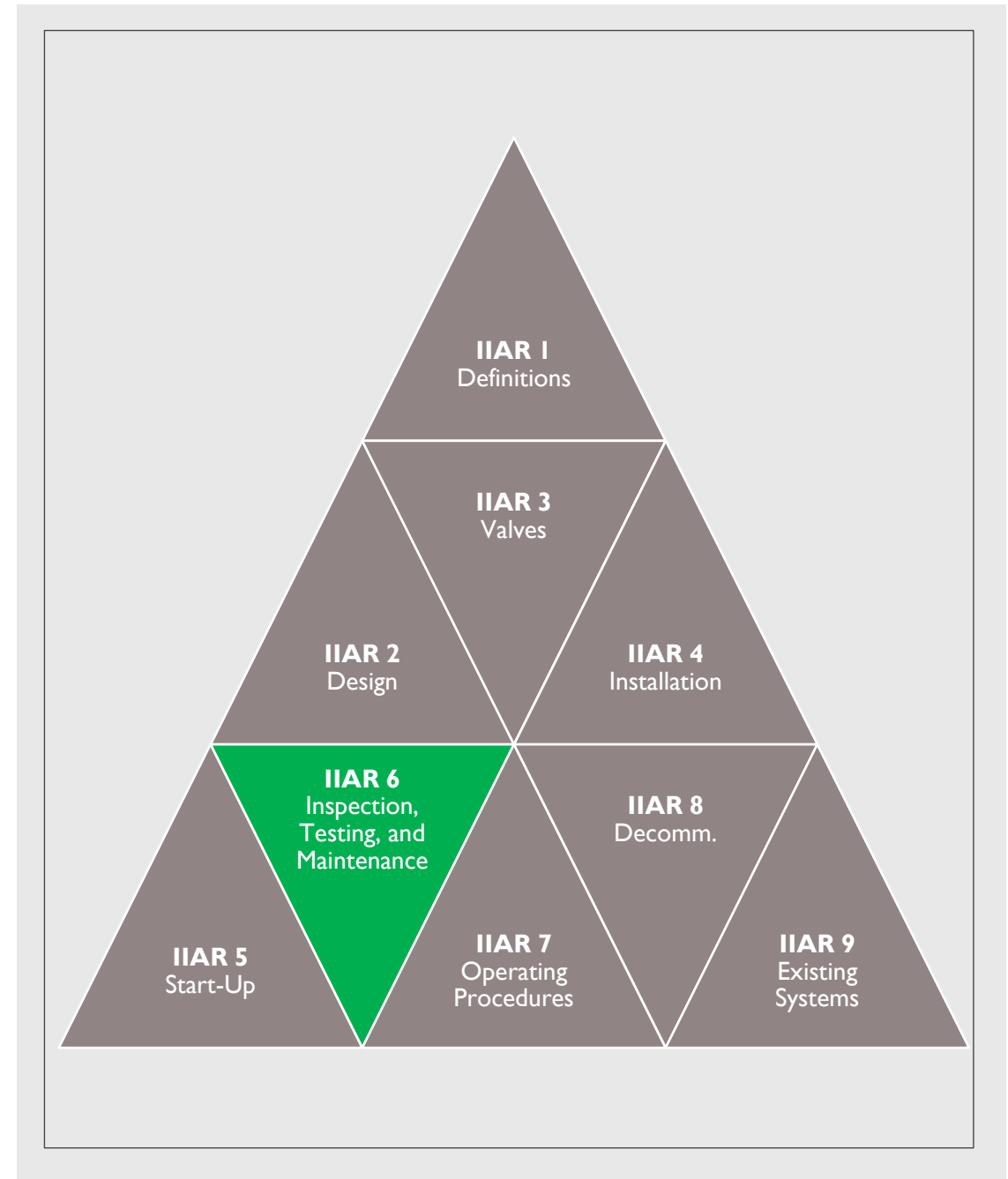
Exception: Relief devices discharging into another part of the closed-loop refrigeration system are not subject to the relief valve replacement practices.

All replacement pressure-relief devices shall be correctly selected in accordance with current editions of ANSI/IIAR 2 and ANSI/ASHRAE 15.

IIAR Bulletins

- IIAR Bulletin No. 110 §6.4.2 [emphasis mine]:
- *The system should be checked regularly for the presence of non-condensable gases which should be purged as necessary from the receiver(s) and/or condenser(s), preferably into a noncondensable gas remover or purger but alternatively into water. Where an automatic purger is fitted, its correct operation should be monitored. If there is a large accumulation of noncondensable gases the reason should be investigated and the cause should be corrected.*





IIAR 6

Part 1 – General

1 – Purpose, Scope, and Applic.

2 – Definitions

3 – Reference Standards

4 – Program Administration

5 – General

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7 – Pumps

8 – Condensers

9 – Evaporators

10 – Vessels

11 – Piping

12 – Safety Systems

13 – Overpressure Protection Devices

14 - Purgers

15 – Ammonia and Secondary Coolants

Part 2 – Program Requirement

Part 3 Appendices

A – Explanatory Material

B – Safety Checklists

C – Water Contamination

D – Avoiding Abnormal Pressure/Shock

E – Risk-Based ITM

F – References

Compliance Schedule [§4.1.3]

- An owner shall be in compliance with this standard when it is adopted by the authority having jurisdiction (AHJ) or when it is adopted by the owner, whichever is first.





Purpose [§1.1]

- This standard specifies minimum requirements for inspection, testing, and maintenance for closed-circuit ammonia refrigeration systems.



Scope [§1.2]

- Record keeping, inspection, testing, and maintenance of closed-circuit ammonia refrigeration systems and ancillary equipment shall comply with this standard. This standard addresses equipment that is common to stationary closed-circuit ammonia refrigeration systems. Due to variations in system design and installation criteria, some systems will not include each type of equipment that this standard addresses.



Responsibility for Compliance

[§4.1.1]

- The owner or owner's designated representative shall be responsible for overseeing and ensuring that inspection, testing, and maintenance is performed in accordance with the requirements of this standard.



IIAR 6

Part 1 – General

Part 2 – Program Requirement

Part 3 Appendices

1 – Purpose, Scope, and Applic.

2 – Definitions

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A – Explanatory Material

B – Safety Checklists

C – Water Contamination

D – Avoiding Abnormal Pressure/Shock

E – Risk-Based ITM

F - References

Type of Purging:

Ammonia Refrigeration Safety Inspection Checklist	
PURGERS	
Location: _____	ID/Tag No.: _____
Facility Owner: _____	
Address: _____	
Contact: _____	Phone: _____
Inspector: _____	Date: _____

- Automatic Refrigerated
- Manual Refrigerated
- Manual, Non-Refrigerated

Equipment Data and Limits:

Manufacturer: _____ Model #: _____ Serial #: _____

Year Mfg.: _____ Design Pressure (psig): _____

Operating (psig / °F): _____ / _____ Normal Liquid Level: _____

Total Internal Vol: _____ Cu. Ft. Normal Ammonia Inventory (lbs.): _____

Material: Carbon Steel, Stainless Steel, Aluminum, Other: _____

Level Indicator Type: None, Armored Bullseye, Level Column w/Bullseye, Flat Armored,
 Level Column Only, Level Column w/ Veri/Techni Level

Relief Valve Data: N/A

Manufacturer: _____ Model: _____ Year Installed: _____

Assembly: Dual w/changeover valve Single Type of Relief Valve: Internal, External

Pressure Setting (psig): _____ Capacity (lbs. air per min/SCFM): _____ / _____

Purge Points:

Purge Point: _____	Purge Point: _____
Purge Point: _____	Purge Point: _____
Purge Point: _____	Purge Point: _____
Purge Point: _____	Purge Point: _____
Purge Point: _____	Purge Point: _____
Purge Point: _____	Purge Point: _____
Purge Point: _____	Purge Point: _____
Purge Point: _____	Purge Point: _____

Ammonia Refrigeration Safety Inspection Checklist	
AMMONIA ABSORPTION SYSTEM	
Location: _____	ID/Tag No.: _____
Facility Owner: _____	
Address: _____	
Contact: _____	Phone: _____
Inspector: _____	Date: _____

Equipment Data and Limits:

Manufacturer: _____ Model: _____ Serial Number: _____

Year Mfg.: _____ Listed Certification: _____ Design Temp. (°F): _____

Voltage: _____ Phase: _____ FLA: _____ Design Press. (psig): _____

Absorber Data: (If ASME approved, use the Pressure Vessels Safety Inspection Checklist)

Material of construction: Steel, Stainless Steel, Aluminum, Other: _____

Absorbent Medium: Liquid-Vapor, Type Liquid: _____ Solid-Vapor, Type Solid: _____

Design Temperature (°F): _____ Operating Temperature (°F): _____

Generator (Desorber) Data:

Material of construction: Steel, Stainless Steel, Aluminum, Other: _____

Generator Heat Source: Gas, Type: _____, Electric, Waste Heat, Fuel Used: _____

Design Temperature (°F): _____ Operating Temperature (°F): _____

Rectifier Data:

Material of construction: Steel, Stainless Steel, Aluminum, Other: _____

Design Temperature (°F): _____ Operating Temperature (°F): _____

For other Ammonia Absorption System equipment or devices, use all applicable Ammonia Refrigeration System Safety Inspection Checklists such as Condensers, Heat Exchangers, Air-Cooling Evaporators, Pressure Vessels (for absorption vessel), Refrigerant Pumps (ammonia or secondary coolant), Pressure Relief Valves, Ventilation, General Safety, etc.

Are other applicable Ammonia Refrigeration System Safety Inspection Checklists used and attached? Yes No
If No, explain:

Ammonia Refrigeration Safety Inspection Checklist

SAFETY SYSTEMS

Location: _____	ID/Tag No.: _____
Facility Owner: _____	
Address: _____	
Contact: _____	Phone: _____
Inspector: _____	Date: _____

Ammonia Detector Data: (Use as many copies of this sheet as necessary to document all detectors)

Detector Type: Catalytic Bead, Electro-chemical, Opto-acoustic, Semi-conductor,
 Infrared, Rupture Disc, Other: _____

Manufacturer: _____ Model: _____ Alarm Levels (ppm): _____ Quantity: _____

Location(s): _____

Detector Type: Catalytic Bead, Electro-chemical, Opto-acoustic, Semi-conductor,
 Infrared, Rupture Disc, Other: _____

Manufacturer: _____ Model: _____ Alarm Levels (ppm): _____ Quantity: _____

Location(s): _____

Detector Type: Catalytic Bead, Electro-chemical, Opto-acoustic, Semi-conductor,
 Infrared, Rupture Disc, Other: _____

Manufacturer: _____ Model: _____ Alarm Levels (ppm): _____ Quantity: _____

Location(s): _____

Machinery Room Ventilation System: (Use as many copies of this sheet as necessary to document all exhaust fans)

Continuous Ventilation Fan Data: Quantity: _____

Manufacturer: _____ Model: _____ Serial Number(s): _____

ID/Tag Number(s): _____ Air Flow (cfm): _____ Year Mfg.: _____

Material: Galv. Steel, Stainless Steel, Aluminum Belt Qty: _____ Belt Size: _____

Intermittent (Temperature Control) Ventilation Fan Data: Quantity: _____

Manufacturer: _____ Model: _____ Serial Number(s): _____

ID/Tag Number(s): _____ Air Flow (cfm): _____ Year Mfg.: _____

Material: Galv. Steel, Stainless Steel, Aluminum Belt Qty: _____ Belt Size: _____

Emergency Ventilation Fan Data: Quantity: _____

Manufacturer: _____ Model: _____ Serial Number(s): _____

ID/Tag Number(s): _____ Air Flow (cfm): _____ Year Mfg.: _____

Material: Galv. Steel, Stainless Steel, Aluminum Belt Qty: _____ Belt Size: _____

Ammonia Refrigeration Safety Inspection Checklist

GENERAL SYSTEM

Location: _____	ID/Tag No.: _____
Facility Owner: _____	
Address: _____	
Contact: _____	Phone: _____
Inspector: _____	Date: _____

This checklist applies to the general system components.

Inspection Items	Conforms	Safety Status	Recommended Action, or Comments	Target Date
a) Equipment labeled and nameplate legible per ANSI/IIAR 2?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
b) All components suitable for ammonia?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
c) Operating within limits?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
d) Fasteners tight, adequately anchored, and supported?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
e) Safe access for Inspection, Testing and Maintenance (ITM)?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
f) Free of excessive ice buildup?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
g) Free of abnormal sounds/vibration?				
h) Free of ammonia leaks?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
i) Adequate protection against traffic hazards?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
j) Sufficient pressure/temperature gauges and/or transducers are present and functioning adequately?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
k) Oil pots installed at all points where oil must be drained?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
l) Oil drain valves are self-closing?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
m) Sign in machinery room prominently displays: a. Name, address and telephone of installing/servicing contractor? b. Approximate quantity of ammonia? c. Lubricant identity and amount? d. Field test pressure?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
n) Aisles in machinery room clearly marked and clear of obstructions?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
o) There is more than one exit from the machinery room?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
p) At least one exit is designated as a principal machinery room door and has required placarding per IIAR 2? Additional principal machinery room doors and auxiliary machinery room doors have required placarding per IIAR 2?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			

Ammonia Refrigeration Safety Inspection Checklist

ID Number: _____

AIR-COOLING EVAPORATORS

Plant Owner: _____
 Address: _____
 Contact: _____ Telephone: _____
 Inspector: _____ Date: _____

Air Cooling Evaporators

Air Cooling Evaporator Location: _____

Air Cooling Identification Mark/No.: _____

Application

- | | | | |
|--|--|--|---|
| <input type="checkbox"/> Blast Freezer | <input type="checkbox"/> Storage Freezer | <input type="checkbox"/> Liquid Recirculation | <input type="checkbox"/> Dry Expansion (DX) |
| <input type="checkbox"/> Process Room | <input type="checkbox"/> Dock | <input type="checkbox"/> Flooded (Surge Drum) | |
| <input type="checkbox"/> Storage Cooler | | <input type="checkbox"/> Other (Describe): _____ | |
| <input type="checkbox"/> Other (Describe): _____ | | | |

Type of Refrigerant Feed

Application Data

Tube and Fin Material: carbon steel stainless steel aluminum

Defrost Type: air water hot gas other _____

Design Room Air Temperature (°F): _____ Normal Refrigerant Temperature (°F): _____

Design Capacity (TR): _____ Design Air Flow (CFM): _____

Total Internal Vol. (cubic ft): _____

Normal Ammonia Inventory (Volume/Weight): cubic ft: _____ lb: _____

Air Cooling Evaporator Nameplate Data

Manufacturer, Name, Model, Serial No.: _____

Year Manufactured: _____ Design Pressure (psig): _____

Fan Motor Nameplate Data

Manufacturer, Name, Model, Serial No., Year Manufactured: _____

Frame Size: _____ Type: _____ Speed (rpm): _____ Power (hp): _____

FLA (amps): _____ Phase: 1 3

Frequency (Hz): _____ Belt size and number: _____

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Ammonia Refrigeration Safety Inspection Checklist

AIR-COOLING EVAPORATOR

Location: _____ ID/Tag No.: _____
 Facility Owner: _____
 Address: _____
 Contact: _____ Phone: _____
 Inspector: _____ Date: _____

Application: Type of Refrigerant Feed:

- | | |
|--|--|
| Blast Freezer..... <input type="checkbox"/> | Liquid Recirculation (Top Feed)..... <input type="checkbox"/> |
| Storage Freezer..... <input type="checkbox"/> | Liquid Recirculation (Bottom Feed)..... <input type="checkbox"/> |
| Storage Cooler..... <input type="checkbox"/> | Flooded (Surge Drum)..... <input type="checkbox"/> |
| Dock..... <input type="checkbox"/> | Direct Expansion (DX)..... <input type="checkbox"/> |
| Process Room..... <input type="checkbox"/> | Ammonia Absorption System..... <input type="checkbox"/> |
| Other (Describe)..... <input type="checkbox"/> | Other (Describe)..... <input type="checkbox"/> |

Equipment Data and Limits:

Manufacturer: _____ Model: _____ Serial Number: _____

Year Manufactured: _____ Design Pressure (psig): _____

Room Air Temp (°F): _____ Suction (psig /°F): _____

Total Internal Vol: _____ Cu. Ft. Normal Ammonia Inventory (lbs.): _____

Tube and Fin Material: Galv. Steel, All Stainless Steel, Aluminum, Stainless tube/Aluminum Fin

Defrost Type: Air, Water, Hot Gas, Other: _____

Fan Motor Data:

Manufacturer: _____ hp: _____ rpm: _____ FLA: _____

Frequency (Hz): _____ Voltage: _____ Phase: _____ Service Factor: _____

Frame Size: _____ Belt Qty: _____ Belt Size: _____ Motor Qty: _____

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Ammonia Refrigeration Safety Inspection Checklist

ID Number: _____

AIR-COOLING EVAPORATORS

Plant Owner: _____
 Address: _____
 Contact: _____ Telephone: _____
 Inspector: _____ Date: _____

Air Cooling Evaporators

Air Cooling Evaporator Location: _____
 Air Cooling Identification Mark/No.: _____

Application

- Blast Freezer Storage Freezer Liquid Recirculation Dry Expansion (DX)
 Process Room Dock Flooded (Surge Drum)
 Storage Cooler Other (Describe): _____
 Other (Describe): _____

Type of Refrigerant Feed

Application Data

Tube and Fin Material: carbon steel stainless steel aluminum
 Defrost Type: air water hot gas other _____
 Design Room Air Temperature (°F): _____ Normal Refrigerant Temperature (°F): _____
 Design Capacity (TR): _____ Design Air Flow (CFM): _____
 Total Internal Vol. (cubic ft): _____
 Normal Ammonia Inventory (Volume/Weight): cubic ft: _____ lb: _____

Air Cooling Evaporator Nameplate Data

Manufacturer, Name, Model, Serial No.: _____
 Year Manufactured: _____ Design Pressure (psig): _____

Fan Motor Nameplate Data

Manufacturer, Name, Model, Serial No., Year Manufactured: _____

Frame Size: _____ Type: _____ Speed (rpm): _____ Power (hp): _____
 Voltage (V): _____ FLA (amps): _____ Phase: 1 3
 Frequency (Hz): _____ Belt size and number: _____

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Ammonia Refrigeration Safety Inspection Checklist

AIR-COOLING EVAPORATOR

Location: _____ ID/Tag No.: _____
 Facility Owner: _____
 Address: _____
 Contact: _____ Phone: _____
 Inspector: _____ Date: _____

Application: Type of Refrigerant Feed:

- Blast Freezer Liquid Recirculation (Top Feed)
 Storage Freezer Liquid Recirculation (Bottom Feed)
 Storage Cooler Flooded (Surge Drum)
 Dock Direct Expansion (DX)
 Process Room Ammonia Absorption System
 Other (Describe) Other (Describe)

Equipment Data and Limits:

Manufacturer: _____ Model: _____ Serial Number: _____
 Year Manufactured: _____ Design Pressure (psig): _____
 Room Air Temp (°F): _____ Suction (psig /°F): _____ /
 Total Internal Vol: _____ Cu. Ft. Normal Ammonia Inventory (lbs.): _____
 Tube and Fin Material: Galv. Steel, All Stainless Steel, Aluminum, Stainless tube/Aluminum Fin
 Defrost Type: Air, Water, Hot Gas, Other: _____

Fan Motor Data:

Manufacturer: _____ hp: _____ rpm: _____ FLA: _____
 Frequency (Hz): _____ Voltage: _____ Phase: _____ Service Factor: _____
 Frame Size: _____ Belt Qty: _____ Belt Size: _____ Motor Qty: _____

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Ammonia Refrigeration Safety Inspection Checklist

ID Number: _____

AIR-COOLING EVAPORATORS

Plant Owner: _____

Address: _____

Contact: _____ Telephone: _____

Inspector: _____ Date: _____

Air Cooling Evaporators

Air Cooling Evaporator Location: _____

Air Cooling Identification Mark/No.: _____

Application

- Blast Freezer
- Process Room
- Storage Cooler
- Other (Describe): _____

- Storage Freezer
- Dock

Type of Refrigerant Feed

- Liquid Recirculation
- Flooded (Surge Drum)
- Other (Describe): _____
- Dry Expansion (DX)

Application Data

Tube and Fin Material: carbon steel stainless steel aluminum

Defrost Type: air water hot gas other

Design Room Air Temperature (°F): _____ Normal Refrigerant Temperature (°F): _____

Design Capacity (TR): _____ Design Air Flow (CFM): _____

Total Internal Vol. (cubic ft): _____

Normal Ammonia Inventory (Volume/Weight): cubic ft: _____ lb: _____

Air Cooling Evaporator Nameplate Data

Manufacturer, Name, Model, Serial No.: _____

Year Manufactured: _____ Design Pressure (psig): _____

Fan Motor Nameplate Data

Manufacturer, Name, Model, Serial No., Year Manufactured: _____

Frame Size: _____ Type: _____ Speed (rpm): _____ Power (hp): _____

FLA (amps): _____ Phase: 1 3

Frequency (Hz): _____ Belt size and number: _____

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Ammonia Refrigeration Safety Inspection Checklist

AIR-COOLING EVAPORATOR

Location: _____ ID/Tag No.: _____

Facility Owner: _____

Address: _____

Contact: _____ Phone: _____

Inspector: _____ Date: _____

Application: Type of Refrigerant Feed:

- Blast Freezer
- Storage Freezer
- Storage Cooler
- Dock
- Process Room
- Other (Describe): _____
- Liquid Recirculation (Top Feed)
- Liquid Recirculation (Bottom Feed).....
- Flooded (Surge Drum).....
- Direct Expansion (DX).....
- Ammonia Absorption System.....
- Other (Describe).....

Equipment Data and Limits:

Manufacturer: _____ Model: _____ Serial Number: _____

Year Manufactured: _____ Design Pressure (psig): _____

Room Air Temp (°F): _____ Suction (psig /°F): _____ /

Total Internal Vol: _____ Cu. Ft. Normal Ammonia Inventory (lbs.): _____

Tube and Fin Material: Galv. Steel, All Stainless Steel, Aluminum, Stainless tube/Aluminum Fin

Defrost Type: Air, Water, Hot Gas, Other: _____

Fan Motor Data:

Manufacturer: _____ hp: _____ rpm: _____ FLA: _____

Frequency (Hz): _____ Voltage: _____ Phase: _____ Service Factor: _____

Frame Size: _____ Belt Qty: _____ Belt Size: _____ Motor Qty: _____

IIAR Standard 6

ID Number: _____

AIR-COOLING EVAPORATORS

Plant Owner: _____

Address: _____

Contact: _____ Telephone: _____

Inspector: _____ Date: _____

Air Cooling Evaporators

Air Cooling Evaporator Location: _____

Air Cooling Identification Mark/No.: _____

Application

- Blast Freezer Storage Freezer
 Process Room Dock
 Storage Cooler
 Other (Describe): _____

Type of Refrigerant Feed

- Liquid Recirculation Dry Expansion (DX)
 Flooded (Surge Drum)
 Other (Describe): _____

Application Data

Tube and Fin Material: carbon steel stainless steel aluminum

Defrost Type: air water hot gas other

Design Room Air Temperature (°F): _____ Normal Refrigerant Temperature (°F): _____

Design Capacity (TR): _____ Design Air Flow (CFM): _____

Total Internal Vol. (cubic ft): _____

Normal Ammonia Inventory (Volume/Weight): cubic ft: _____ lb: _____

Air Cooling Evaporator Nameplate Data

Manufacturer, Name, Model, Serial No.: _____

Year Manufactured: _____ Design Pressure (psig): _____

Fan Motor Nameplate Data

Manufacturer, Name, Model, Serial No., Year Manufactured: _____

Frame Size: _____ Type: _____ Speed (rpm): _____ Power (hp): _____

FLA (amps): _____ Phase: 1 3

Frequency (Hz): _____ Belt size and number: _____

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Ammonia Refrigeration Safety Inspection Checklist

AIR-COOLING EVAPORATOR

Location: _____ ID/Tag No.: _____

Facility Owner: _____

Address: _____

Contact: _____ Phone: _____

Inspector: _____ Date: _____

Application: Type of Refrigerant Feed:

- Blast Freezer
 Storage Freezer
 Storage Cooler
 Dock
 Process Room
 Other (Describe): _____

- Liquid Recirculation (Top Feed)
 Liquid Recirculation (Bottom Feed)
 Flooded (Surge Drum)
 Direct Expansion (DX)
 Ammonia Absorption System
 Other (Describe): _____

Equipment Data and Limits:

Manufacturer: _____ Model: _____ Serial Number: _____

Year Manufactured: _____ Design Pressure (psig): _____

Room Air Temp (°F): _____ Suction (psig/°F): _____

Total Internal Vol: _____ Cu. Ft. Normal Ammonia Inventory (lbs.): _____

Tube and Fin Material: Galv. Steel, All Stainless Steel, Aluminum, Stainless tube/Aluminum Fin

Defrost Type: Air, Water, Hot Gas, Other: _____

Fan Motor Data:

Manufacturer: _____ hp: _____ rpm: _____ FLA: _____

Frequency (Hz): _____ Voltage: _____ Phase: _____ Service Factor: _____

Frame Size: _____ Belt Qty: _____ Belt Size: _____ Motor Qty: _____

IIAR Standard 6

Ammonia Refrigeration Safety Inspection Checklist

ID Number: _____

AIR-COOLING EVAPORATORS

Plant Owner: _____

Address: _____

Contact: _____ Telephone: _____

Inspector: _____ Date: _____

Air Cooling Evaporators

Air Cooling Evaporator Location: _____

Air Cooling Identification Mark/No.: _____

Application

- | | | | |
|--|--|--|---|
| <input type="checkbox"/> Blast Freezer | <input type="checkbox"/> Storage Freezer | <input type="checkbox"/> Liquid Recirculation | <input type="checkbox"/> Dry Expansion (DX) |
| <input type="checkbox"/> Process Room | <input type="checkbox"/> Dock | <input type="checkbox"/> Flooded (Surge Drum) | |
| <input type="checkbox"/> Storage Cooler | | <input type="checkbox"/> Other (Describe): _____ | |
| <input type="checkbox"/> Other (Describe): _____ | | | |

Type of Refrigerant Feed

Application Data

Tube and Fin Material: carbon steel stainless steel aluminum

Defrost Type: air water hot gas other _____

Design Room Air Temperature (°F): _____ Normal Refrigerant Temperature (°F): _____

Design Capacity (TR): _____ Design Air Flow (CFM): _____

Total Internal Vol. (cubic ft): _____

Normal Ammonia Inventory (Volume/Weight): cubic ft: _____ lb: _____

Air Cooling Evaporator Nameplate Data

Manufacturer, Name, Model, Serial No.: _____

Year Manufactured: _____ Design Pressure (psig): _____

Fan Motor Nameplate Data

Manufacturer, Name, Model, Serial No., Year Manufactured: _____

Frame Size: _____ Type: _____ Speed (rpm): _____ Power (hp): _____

FLA (amps): _____ Phase: 1 3

Frequency (Hz): _____ Belt size and number: _____

IIAR Bulletin No. 109

Ammonia Refrigeration Safety Inspection Checklist

AIR-COOLING EVAPORATOR

Location: _____ ID/Tag No.: _____

Facility Owner: _____

Address: _____

Contact: _____ Phone: _____

Inspector: _____ Date: _____

Application: Type of Refrigerant Feed:

- | | |
|--|---|
| <input type="checkbox"/> Blast Freezer | <input type="checkbox"/> Liquid Recirculation (Top Feed) |
| <input type="checkbox"/> Storage Freezer | <input type="checkbox"/> Liquid Recirculation (Bottom Feed) |
| <input type="checkbox"/> Storage Cooler | <input type="checkbox"/> Flooded (Surge Drum) |
| <input type="checkbox"/> Dock | <input type="checkbox"/> Direct Expansion (DX) |
| <input type="checkbox"/> Process Room | <input type="checkbox"/> Ammonia Absorption System |
| <input type="checkbox"/> Other (Describe): _____ | <input type="checkbox"/> Other (Describe): _____ |

Equipment Data and Limits:

Manufacturer: _____ Model: _____ Serial Number: _____

Year Manufactured: _____ Design Pressure (psig): _____

Room Air Temp (°F): _____ Suction (psig / °F): _____

Total Internal Vol: _____ Cu. Ft. Normal Ammonia Inventory (lbs.): _____

Tube and Fin Material: Galv. Steel, All Stainless Steel, Aluminum, Stainless tube/Aluminum Fin

Defrost Type: Air, Water, Hot Gas, Other: _____

Fan Motor Data:

Manufacturer: _____ hp: _____ rpm: _____ FLA: _____

Frequency (Hz): _____ Voltage: _____ Phase: _____ Service Factor: _____

Frame Size: _____ Belt Qty: _____ Belt Size: _____ Motor Qty: _____

IIAR Standard 6

Ammonia Refrigeration Safety Inspection Checklist

ID Number: _____

AIR-COOLING EVAPORATORS

Plant Owner: _____

Address: _____

Contact: _____ Telephone: _____

Inspector: _____ Date: _____

Air Cooling Evaporators

Air Cooling Evaporator Location: _____

Air Cooling Identification Mark/No.: _____

Application

- | | | | |
|--|--|--|---|
| <input type="checkbox"/> Blast Freezer | <input type="checkbox"/> Storage Freezer | <input type="checkbox"/> Liquid Recirculation | <input type="checkbox"/> Dry Expansion (DX) |
| <input type="checkbox"/> Process Room | <input type="checkbox"/> Dock | <input type="checkbox"/> Flooded (Surge Drum) | |
| <input type="checkbox"/> Storage Cooler | | <input type="checkbox"/> Other (Describe): _____ | |
| <input type="checkbox"/> Other (Describe): _____ | | | |

Type of Refrigerant Feed

Application Data

Tube and Fin Material: carbon steel stainless steel aluminum

Defrost Type: air water hot gas other _____

Design Room Air Temperature (°F): _____ Normal Refrigerant Temperature (°F): _____

Design Capacity (TR): _____ Design Air Flow (CFM): _____

Total Internal Vol. (cubic ft): _____

Normal Ammonia Inventory (Volume/Weight): cubic ft: _____ lb: _____

Air Cooling Evaporator Nameplate Data

Manufacturer, Name, Model, Serial No.: _____

Year Manufactured: _____ Design Pressure (psig): _____

Fan Motor Nameplate Data

Manufacturer, Name, Model, Serial No., Year Manufactured: _____

Frame Size: _____ Type: _____ Speed (rpm): _____ Power (hp): _____

FLA (amps): _____ Phase: 1 3

Frequency (Hz): _____ Belt size and number: _____

IIAR Bulletin No. 109

Ammonia Refrigeration Safety Inspection Checklist

AIR-COOLING EVAPORATOR

Location: _____ ID/Tag No.: _____

Facility Owner: _____

Address: _____

Contact: _____ Phone: _____

Inspector: _____ Date: _____

Application: Type of Refrigerant Feed:

- | | | | |
|-----------------------|--------------------------|---|--------------------------|
| Blast Freezer..... | <input type="checkbox"/> | Liquid Recirculation (Top Feed)..... | <input type="checkbox"/> |
| Storage Freezer..... | <input type="checkbox"/> | Liquid Recirculation (Bottom Feed)..... | <input type="checkbox"/> |
| Storage Cooler..... | <input type="checkbox"/> | Flooded (Surge Drum)..... | <input type="checkbox"/> |
| Dock..... | <input type="checkbox"/> | Direct Expansion (DX)..... | <input type="checkbox"/> |
| Process Room..... | <input type="checkbox"/> | Ammonia Absorption System..... | <input type="checkbox"/> |
| Other (Describe)..... | <input type="checkbox"/> | Other (Describe)..... | <input type="checkbox"/> |

Equipment Data and Limits:

Manufacturer: _____ Model: _____ Serial Number: _____

Year Manufactured: _____ Design Pressure (psig): _____

Room Air Temp (°F): _____ Suction (psig /°F): _____ /

Total Internal Vol: _____ Cu. Ft. Normal Ammonia Inventory (lbs.): _____

Tube and Fin Material: Galv. Steel, All Stainless Steel, Aluminum, Stainless tube/Aluminum Fin

Defrost Type: Air, Water, Hot Gas, Other: _____

Fan Motor Data:

Manufacturer: _____ hp: _____ rpm: _____ FLA: _____

Frequency (Hz): _____ Voltage: _____ Phase: _____ Service Factor: _____

Frame Size: _____ Belt Qty: _____ Belt Size: _____ Motor Qty: _____

IIAR Standard 6

AIR-COOLING EVAPORATORS

Requirement/Recommendation	Conforms	Recommended Action/Comments	Safety Status	Target Date
a) Nameplate legible & complete?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
b) Suitable for ammonia?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
c) Operation within limits?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
d) Adequately anchored and supported?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
e) Safe access for service & maintenance?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
f) Free from excessive vibration?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
g) Adequate protection against traffic hazards?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
h) Evaporator free from excessive ice buildup and clean of dirt?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
i) Drive properly guarded & protected?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
j) Evaporator condition (check one) <input type="checkbox"/> clean, no visible corrosion <input type="checkbox"/> slight visible corrosion <input type="checkbox"/> extensive corrosion				

Are there any other conditions that might negatively affect safe evaporator operation? Yes No
 If yes, describe: _____



IIAR Bulletin No. 109

Ammonia Refrigeration Safety Inspection Checklist
AIR-COOLING EVAPORATOR

Location: _____ ID/Tag No.: _____

Inspection Items	Conforms	Safety Status	Recommended Action, or Comments	Target Date
a) Equipment labeled and nameplate legible per ANSI/IIAR 2?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
b) Suitable for ammonia?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
c) Operating within limits?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
d) Fasteners tight, adequately anchored, and supported?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
e) Safe access for inspection, Testing and Maintenance (ITM)?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
f) Free of excessive ice buildup?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
g) Free of abnormal sounds/vibration?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
h) Free of ammonia leaks?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
i) All piping has markers per ANSI/IIAR 2?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
j) Are valves in good condition?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
k) Are critical manual and control valves tagged, exercised, and stems lubricated?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
l) Sufficient pressure/temperature gauges and/or transducers are present and functioning adequately?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
m) Belts, sheaves, coupling, etc., in good working order and adequately guarded?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
n) Free of pitting and surface damage and coils free of dirt? a. If No, note damage level:	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> Slight <input type="checkbox"/> Extensive <input type="checkbox"/>			
o) Free of any other conditions that negatively affect safe operation?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			



If No, describe: _____

IIAR Standard 6

AIR-COOLING EVAPORATORS

Requirement/Recommendation	Conforms	Recommended Action/Comments	Safety Status	Target Date
a) Nameplate legible & complete?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
b) Suitable for ammonia?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
c) Operation within limits?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
d) Adequately anchored and supported?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
e) Safe access for service & maintenance?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
f) Free from excessive vibration?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
g) Adequate protection against traffic hazards?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
h) Evaporator free from excessive ice buildup and clean of dirt?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
i) Drive properly guarded & protected?	<input type="checkbox"/> Yes <input type="checkbox"/> No			

j) Evaporator condition (check one) clean, no visible corrosion slight visible corrosion extensive corrosion

Are there any other conditions that might negatively affect safe evaporator operation? Yes No

If yes, describe: _____

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Ammonia Refrigeration Safety Inspection Checklist

AIR-COOLING EVAPORATOR

Location:		ID/Tag No.:		
Inspection Items	Conforms	Safety Status	Recommended Action, or Comments	Target Date
a) Equipment labeled and nameplate legible per ANSI/IIAR 2?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
b) Suitable for ammonia?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
c) Operating within limits?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
d) Fasteners tight, adequately anchored, and supported?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
e) Safe access for inspection, testing and maintenance (ITM)?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
f) Free of excessive ice buildup?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
g) Free of abnormal sounds/vibration?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
h) Free of ammonia leaks?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
i) All piping has markers per ANSI/IIAR 2?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
j) Are valves in good condition?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
k) Are critical manual and control valves tagged, exercised, and stems lubricated?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
l) Sufficient pressure/temperature gauges and/or transducers are present and functioning adequately?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
m) Belts, sheaves, coupling, etc., in good working order and adequately guarded?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
n) Free of pitting and surface damage and coils free of dirt? a. If No, note damage level:	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/> Slight <input type="checkbox"/> Extensive <input type="checkbox"/>			
o) Free of any other conditions that negatively affect safe operation?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			

If No, describe:

IIAR Standard 6

	and Maintenance (ITM)?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
	f) Free of excessive ice buildup?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
	g) Free of abnormal sounds/vibration?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
	h) Free of ammonia leaks?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
	i) All piping has markers per ANSI/IIAR 2?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
	j) Are valves in good condition?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
	k) Are critical manual and control valves tagged, exercised, and stems lubricated?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
	l) Sufficient pressure/temperature gauges and/or transducers are present and functioning adequately?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			
	m) Belts, sheaves, coupling, etc., in good working order and adequately	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>			



IIAR 6

The image shows a balance scale with a horizontal beam supported by a triangular fulcrum. On the left side of the beam is a rounded rectangular box containing the text 'IIAR 6'. On the right side is a larger rounded rectangular box containing the text 'PSM Mechanical Integrity Requirements'. The scale is positioned over a background of a large stack of papers.

PSM Mechanical
Integrity
Requirements

ANSI/IIAR 6-
2019 §5.1

The owner or owner's designated representative shall ensure an inspection, testing, and maintenance program is developed to reduce the probability of an ammonia release.

Title 8
§5189(j)(1)(A)

The employer shall establish and implement written procedures to maintain the ongoing integrity of process equipment and appurtenances.

IIAR 6**Title 8 §5189(j)(2)D)**

Date of the inspection or test

Date of Inspection

Name of the individual or individuals who performed the inspection or test

Name of person who performed inspection or test

Serial number or other identifier of the equipment on which the inspection or test was performed

Serial number or other identifier

Description of the inspection or test performed

Recommended corrective action(s) for each deficiency identified

Description of corrective action(s) for each deficiency identified

Identification of each designated responsible person assigned and authorized to remedy each deficiency identified

Results based on the conditions at commencement of the inspection or test, including instrumentation readings

Expected activation set points (+/-) including a functional description of the control logic

Results based on the conditions after completion of the inspection or test, including instrumentation readings

Expected completion date(s)

Actual completion date(s)



16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

freitag

Period	Calendar Basis	Runtime Basis (hours)
Daily	Occurring once per 24 hours.	24
Weekly	Occurring once per calendar week.	168
Monthly	Occurring once per calendar month.	730
Quarterly	Occurring four times per year. The minimum period between ITM tasks is 2 months. The maximum is 4 months.	2,190
Semiannual	Occurring twice per 12 consecutive months. The minimum period between ITM tasks is 4 months. The maximum is 8 months.	4,380
Annual	Occurring once per year. The minimum period between ITM tasks is 9 months. The maximum is 15 months.	8,760
Biennial (Two Years)	Occurring once every other year. The minimum period between ITM tasks is 21 months. The maximum is 27 months.	17,520
Three Years	Occurring once every 36 months. The minimum period between ITM tasks is 30 months. The maximum is 42 months.	26,280
Five Years	Occurring once every 60 months. The minimum period between ITM tasks is 54 months. The maximum is 66 months.	43,800
Ten Years	Occurring once every 120 months. The minimum period between ITM tasks is 108 months. The maximum is 132 months.	87,600

Period	Calendar Basis	Runtime Basis (hours)
Daily	Occurring once per 24 hours.	24
Weekly	Occurring once per calendar week.	168
Monthly	Occurring once per calendar month.	730
Quarterly	Occurring four times per year. The minimum period between ITM tasks is 2 months. The maximum is 4 months.	2,190
Semiannual	Occurring twice per 12 consecutive months. The minimum period between ITM tasks is 4 months. The maximum is 8 months.	4,380
Annual	Occurring once per year. The minimum period between ITM tasks is 9 months. The maximum is 15 months.	8,760
Biennial (Two Years)	Occurring once every other year. The minimum period between ITM tasks is 21 months. The maximum is 27 months.	17,520
Three Years	Occurring once every 36 months. The minimum period between ITM tasks is 30 months. The maximum is 42 months.	26,280
Five Years	Occurring once every 60 months. The minimum period between ITM tasks is 54 months. The maximum is 66 months.	43,800
Ten Years	Occurring once every 120 months. The minimum period between ITM tasks is 108 months. The maximum is 132 months.	87,600

Period	Calendar Basis	Runtime Basis (hours)
Daily	Occurring once per 24 hours.	24
Weekly	Occurring once per calendar week.	168
Monthly	Occurring once per calendar month.	730
Quarterly	Occurring four times per year. The minimum period between ITM tasks is 2 months. The maximum is 4 months.	2,190
Semiannual	Occurring twice per 12 consecutive months. The minimum period between ITM tasks is 4 months. The maximum is 8 months.	4,380
Annual	Occurring once per year. The minimum period between ITM tasks is 9 months. The maximum is 15 months.	8,760
Biennial (Two Years)	Occurring once every other year. The minimum period between ITM tasks is 21 months. The maximum is 27 months.	17,520
Three Years	Occurring once every 36 months. The minimum period between ITM tasks is 30 months. The maximum is 42 months.	26,280
Five Years	Occurring once every 60 months. The minimum period between ITM tasks is 54 months. The maximum is 66 months.	43,800
Ten Years	Occurring once every 120 months. The minimum period between ITM tasks is 108 months. The maximum is 132 months.	87,600



Frequencies

- D – Daily
- W – Weekly
- M – Monthly
- Q – Quarterly
- S – Semiannual
- A – Annual
- B - Biennial,
- 3 - Three Years
- 5 - Five Years
- 10 - Ten Years
- WA - Where Applicable
- NA - Not Applicable
- NR - Not Required



Frequencies

- D – Daily
- W – Weekly
- M – Monthly
- Q – Quarterly
- S – Semiannual
- A – Annual
- B - Biennial,
- 3 - Three Years
- 5 - Five Years
- 10 - Ten Years
- WA - Where Applicable
- NA - Not Applicable
- NR - Not Required

ITM Task Description	Frequency			ITM Task	Frequency		
Inspection	Screw	Recip	Rotary Vane	Inspection	Screw	Recip	Rotary Vane
a) Runtime hours	WA-D	WA-D	WA-D	q) Drive guard in place	D	D	D
b) Suction pressure	D	D	D	r) Foundation solid, in place, and free from evidence of deterioration	A	A	A
c) Discharge pressure	D	D	D	s) Visually inspect mounting bolts are in place	A	A	A
d) Oil pressure	D	D	D	t) Visually inspect metal surfaces for pitting or surface damage	A	A	A
e) Oil temperature	D	WA-D	D	u) Visually inspect coupling for wear	A	WA-A	WA-A
f) Discharge temperature	D	WA-D	D	v) Visually inspect starter connections and associated timers and relays	A	A	A
g) Verify oil levels are adequate	D	D	D	w) Operation of oil heaters	A	A	A
h) Oil filter differential pressure	D	WA-D	NA	x) Operation of unloader	M	M	M
i) Oil leaks	D	D	D	y) Visually inspect alignment of compressor-motor drive shaft	A	A	A
j) Lubricator oil level and drip rate	NA	NA	D	Testing	Screw	Recip	Rotary Vane
k) Jacket cooling oil level	NA	NA	D	Test safety shutdowns:			
l) Determine shaft seal leak rate	WA-W	WA-W	WA-W	a) Low suction pressure cutout	A	A	A
m) Indicator of Compressor Capacity	D	WA-D	WA-D	b) High discharge pressure cutout (HPCO)	A	A	A
n) Motor amperage (current)	D	WA-D	WA-D	See Section 6.1.1			
o) Recorded Alarms and Shutdowns	D	WA-D	WA-D				
p) Free from abnormal sounds and excessive vibration	D	D	D				

ITM Task Description	Frequency			ITM Task	Frequency		
Inspection	Screw	Recip	Rotary Vane	Inspection	Screw	Recip	Rotary Vane
a) Runtime hours	WA-D	WA-D	WA-D	q) Drive guard in place	D	D	D
b) Suction pressure	D	D	D	r) Foundation solid, in place, and free from evidence of deterioration	A	A	A
c) Discharge pressure	D	D	D	s) Visually inspect mounting bolts are in place	A	A	A
d) Oil pressure	D	D	D	t) Visually inspect metal surfaces for pitting or surface damage	A	A	A
e) Oil temperature	D	WA-D	D	u) Visually inspect coupling for wear	A	WA-A	WA-A
f) Discharge temperature	D	WA-D	D	v) Visually inspect starter connections and associated timers and relays	A	A	A
g) Verify oil levels are adequate	D	D	D	w) Operation of oil heaters	A	A	A
h) Oil filter differential pressure	D	WA-D	NA	x) Operation of unloader	M	M	M
i) Oil leaks	D	D	D	y) Visually inspect alignment of compressor-motor drive shaft	A	A	A
j) Lubricator oil level and drip rate	NA	NA	D	Testing	Screw	Recip	Rotary Vane
k) Jacket cooling oil level	NA	NA	D	Test safety shutdowns:			
l) Determine shaft seal leak rate	WA-W	WA-W	WA-W	a) Low suction pressure cutout	A	A	A
m) Indicator of Compressor Capacity	D	WA-D	WA-D	b) High discharge pressure cutout (HPCO)	A	A	A
n) Motor amperage (current)	D	WA-D	WA-D	See Section 6.1.1			
o) Recorded Alarms and Shutdowns	D	WA-D	WA-D				
p) Free from abnormal sounds and excessive vibration	D	D	D				

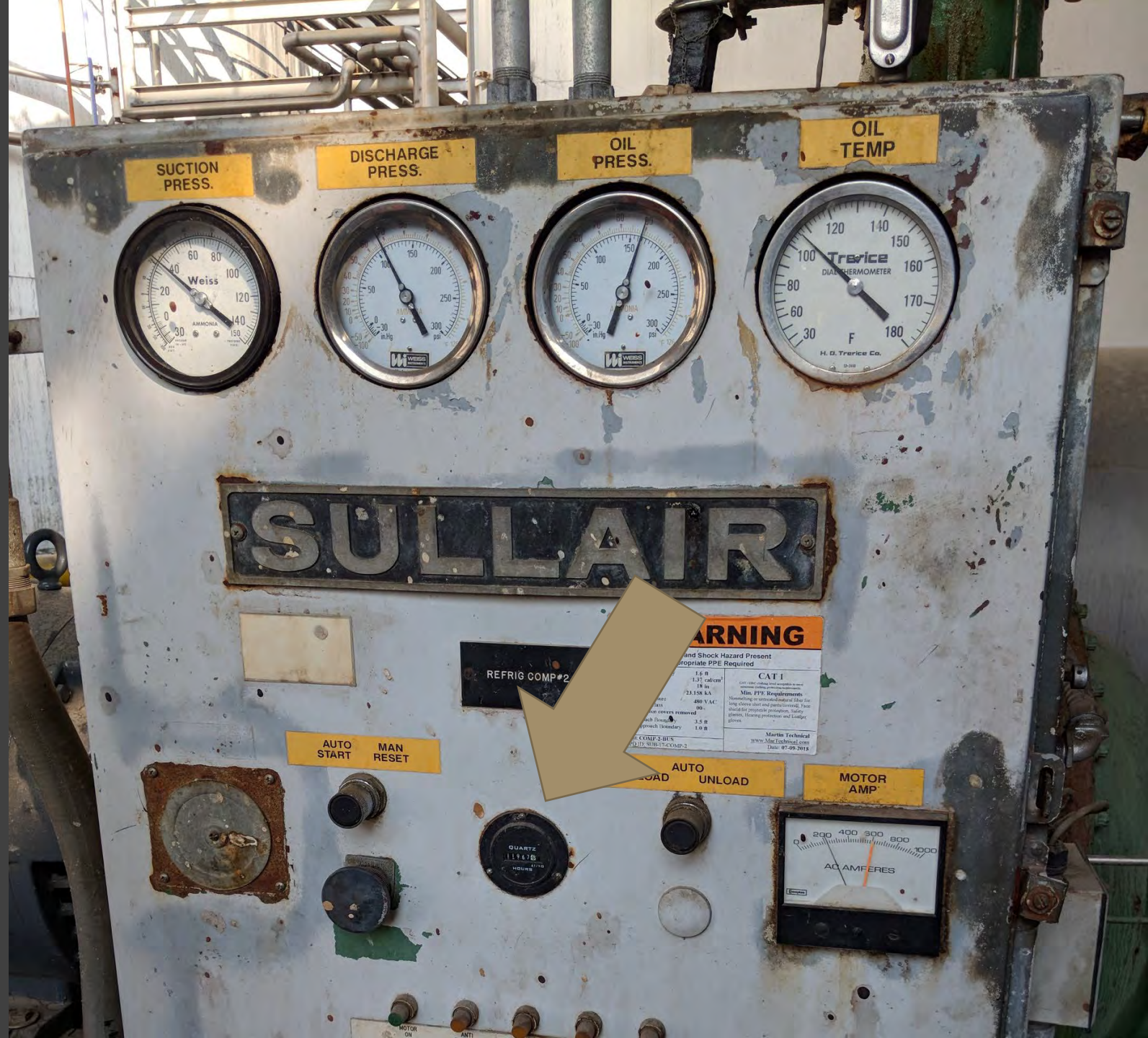
ITM Task Description	Frequency		
Inspection	Screw	Recip	Rotary Vane
a) Runtime hours	WA-D	WA-D	WA-D
b) Suction pressure	D	D	D
c) Discharge pressure	D	D	D
d) Oil pressure	D	D	D
e) Oil temperature	D	WA-D	D
f) Discharge temperature	D	WA-D	D
g) Verify oil levels are adequate	D	D	D
h) Oil filter differential pressure	D	WA-D	NA
i) Oil leaks	D	D	D
j) Lubricator oil level and drip rate	NA	NA	D
k) Jacket cooling oil level	NA	NA	D
l) Determine shaft seal leak rate	WA-W	WA-W	WA-W
m) Indicator of Compressor Capacity	D	WA-D	WA-D
n) Motor amperage (current)	D	WA-D	WA-D
o) Recorded Alarms and Shutdowns	D	WA-D	WA-D
p) Free from abnormal sounds and excessive vibration	D	D	D

ITM Task	Frequency		
Inspection	Screw	Recip	Rotary Vane
q) Drive guard in place	D	D	D
r) Foundation solid, in place, and free from evidence of deterioration	A	A	A
s) Visually inspect mounting bolts are in place	A	A	A
t) Visually inspect metal surfaces for pitting or surface damage	A	A	A
u) Visually inspect coupling for wear	A	WA-A	WA-A
v) Visually inspect starter connections and associated timers and relays	A	A	A
w) Operation of oil heaters	A	A	A
x) Operation of unloader	M	M	M
y) Visually inspect alignment of compressor-motor drive shaft	A	A	A
Testing	Screw	Recip	Rotary Vane
Test safety shutdowns:			
a) Low suction pressure cutout	A	A	A
b) High discharge pressure cutout (HPCO) See Section 6.1.1	A	A	A

ITM Task Description	Frequency			ITM Task	Frequency		
Inspection	Screw	Recip	Rotary Vane	Inspection	Screw	Recip	Rotary Vane
a) Runtime hours	WA-D	WA-D	WA-D	q) Drive guard in place	D	D	D
b) Suction pressure	D	D	D	r) Foundation solid, in place, and free from evidence of deterioration	A	A	A
c) Discharge pressure	D	D	D	s) Visually inspect mounting bolts are in place	A	A	A
d) Oil pressure	D	D	D	t) Visually inspect metal surfaces for pitting or surface damage	A	A	A
e) Oil temperature	D	WA-D	D	u) Visually inspect coupling for wear	A	WA-A	WA-A
f) Discharge temperature	D	WA-D	D	v) Visually inspect starter connections and associated timers and relays	A	A	A
g) Verify oil levels are adequate	D	D	D	w) Operation of oil heaters	A	A	A
h) Oil filter differential pressure	D	WA-D	NA	x) Operation of unloader	M	M	M
i) Oil leaks	D	D	D	y) Visually inspect alignment of compressor-motor drive shaft	A	A	A
j) Lubricator oil level and drip rate	NA	NA	D	Testing	Screw	Recip	Rotary Vane
k) Jacket cooling oil level	NA	NA	D	Test safety shutdowns:			
l) Determine shaft seal leak rate	WA-W	WA-W	WA-W	a) Low suction pressure cutout	A	A	A
m) Indicator of Compressor Capacity	D	WA-D	WA-D	b) High discharge pressure cutout (HPCO) See Section 6.1.1	A	A	A
n) Motor amperage (current)	D	WA-D	WA-D				
o) Recorded Alarms and Shutdowns	D	WA-D	WA-D				
p) Free from abnormal sounds and excessive vibration	D	D	D				

DAILY INSPECTIONS

Record compressor runtime (hours)



COMPRESSOR 1
SCCP-1

Quantum™ HD

Johnson Controls

Normal New Event - See The Event Log COMPRESSOR 1
10.20.30.21
10/17/2016 08:27:41

Home

Alarms

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Contacts

Package Operating Values

	Pressure	Temperature	Superheat
Suction	5.3 PSIG	-7.6 °F	9.5 °F
Discharge	128.3 PSIG	185.3 °F	109.4 °F
Oil	145.9 PSIG	130.4 °F	
Separator		166.4 °F	
Filter Differential	2.9 PSI		
Motor Amps	597 AMPS	Motor Recycle Delay	00:00
Motor % FLA	90.0 %	Motor Run Hours	248 HRS
Motor Kilowatts Est.	438 kW		

System Operating Values

Select Data

Capacity Management

Capacity Control Setpoint
Mode 3 5.0 PSIG
Actual 5.3 PSIG

Compressor

Compressor Running
Capacity Slide Idle 99.9 %
Volume Slide Idle 4.48

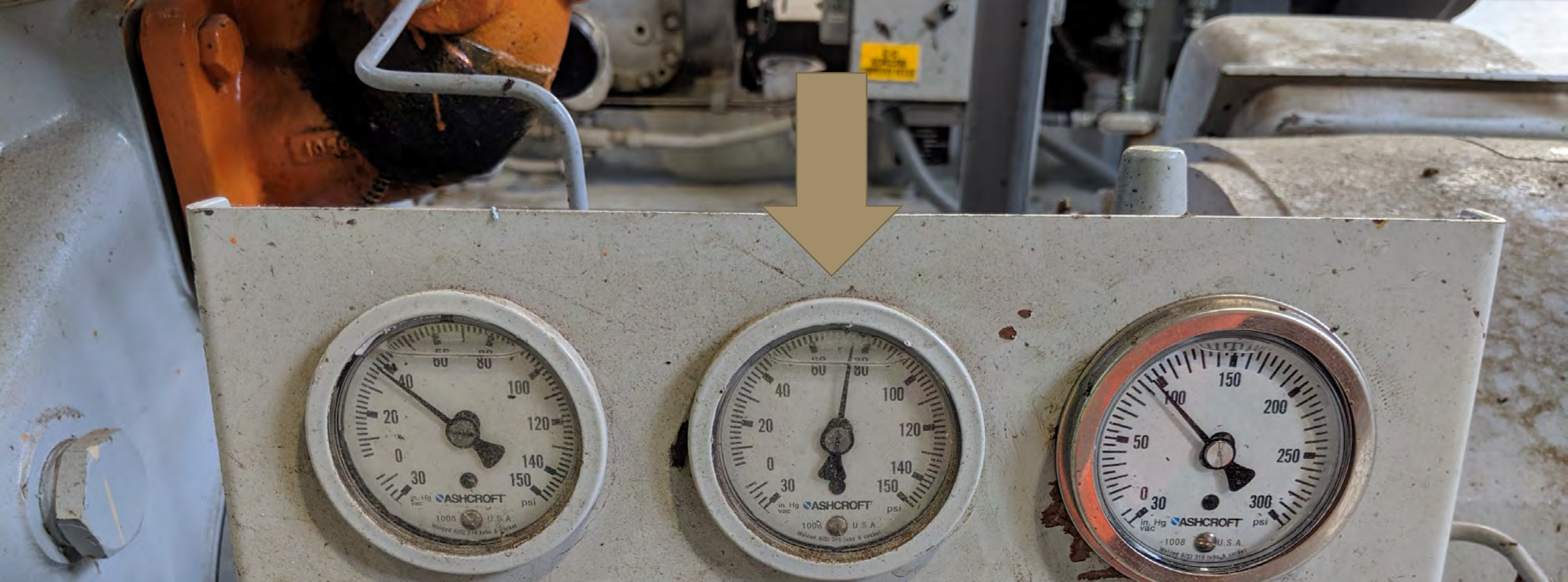
Compressor	Capacity	Volume

Frick®
BY JOHNSON CONTROLS

WARNING - OPEN ALL REMOTE DISCONNECTS BEFORE SERVICING

DAILY INSPECTIONS


Record compressor suction pressure



DAILY INSPECTIONS

Record compressor discharge pressure

Micro III



ANALOG DATA

Inlet Oil Press	192.5 Psi
Oil Filter Diff	1.2 Psi
Oil Filter Inlet	193.7 Psi
Oil Separator TP	165.2 °F
Inlet Oil Temp	120.9 °F
Discharge Temp	174.6 °F
Suction Temp	5.7 °F

COMPRESSOR CONTROL

STOP	SHUT-DOWNS	PWR FAIL RESET	AUTO
------	------------	----------------	------

OIL	WARNING		HOLD
-----	---------	--	------

DAILY INSPECTIONS

Record compressor oil pressure

DAILY INSPECTIONS

Record compressor oil temperature



DAILY INSPECTIONS

Record compressor
discharge temperature



Normal **New Event - See The Event Log** COMPRESSOR 1
 Control : Suction Pressure
 Setpoint : 5.0 PSIG - Actual : 5.3 PSIG
 10.20.30.21
 10/17/2016 08:27:41

Home Alarms Login

Contacts

Package Operating Values

	Pressure	Temperature	Superheat
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Motor Amps	597 AMPS	Motor Recycle Delay	00:00
Motor % FLA	90.0 %	Motor Run Hours	248 HRS
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Capacity Management

Capacity Control Setpoint
 Mode 1 3.0 PSIG

Actual 5.3 PSIG

Compressor

Compressor Running

Capacity Slide Idle 99.9 %

Volume Slide Idle 4.48

Compressor	Capacity	Volume

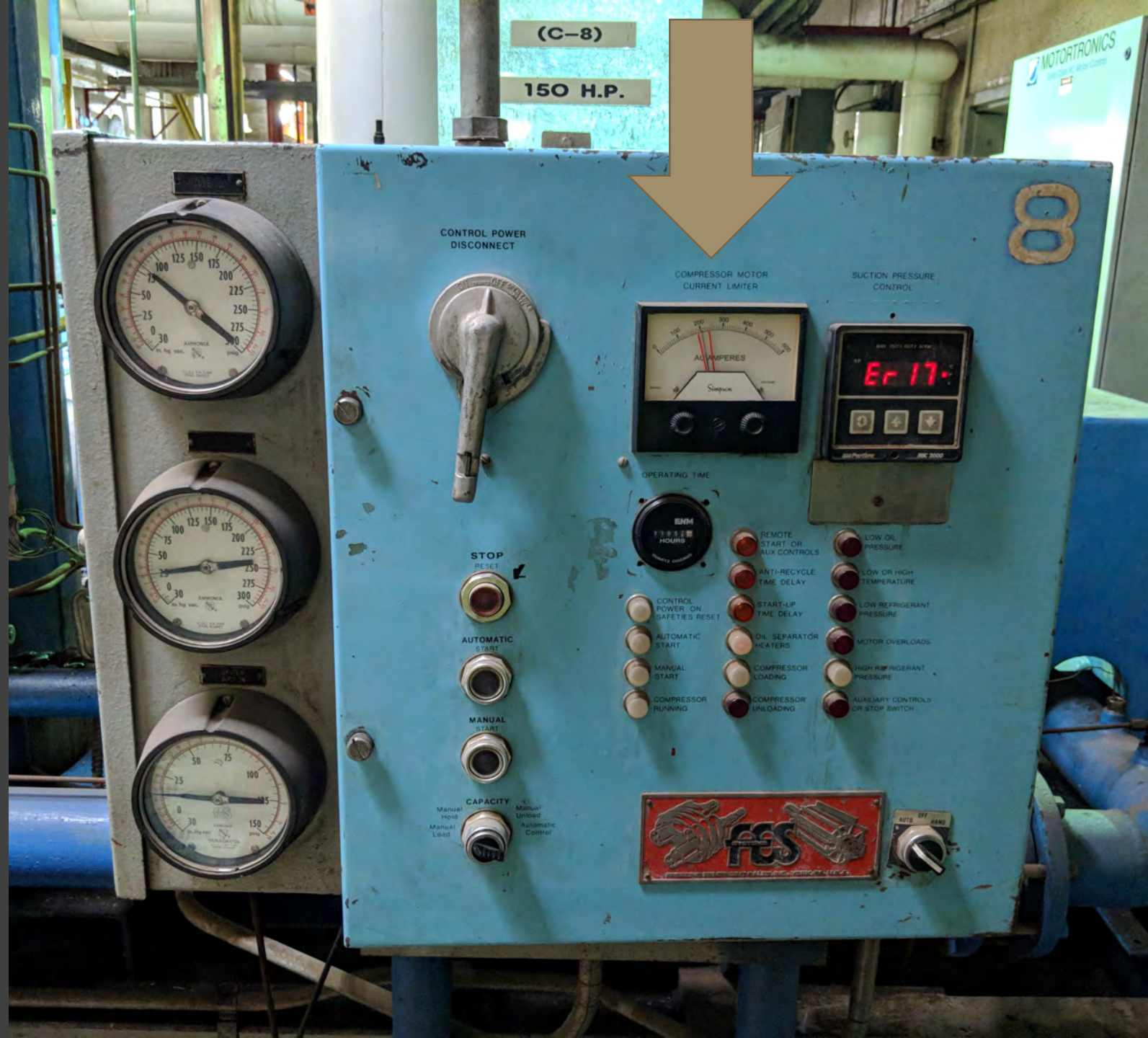


DAILY INSPECTIONS

Record compressor oil filter differential pressure

DAILY INSPECTIONS

Record compressor motor amperage



DAILY INSPECTIONS

Record compressor alarms and shutdowns

Micro III

PARAMETERS

Inlet Oil Press	192.5 Psi
Oil Filter Diff	1.2 Psi
Oil Filter Inlet	193.7 Psi
Oil Separator TP	165.2 °F
Inlet Oil Temp	120.9 °F
Discharge Temp	174.6 °F
Suction Temp	5.7 °F

COMPRESSOR CONTROL

STOP

SHUT-
DOWNS

PWR
FAIL
RESET

AUTO

OIL

HOLD

DAILY INSPECTIONS

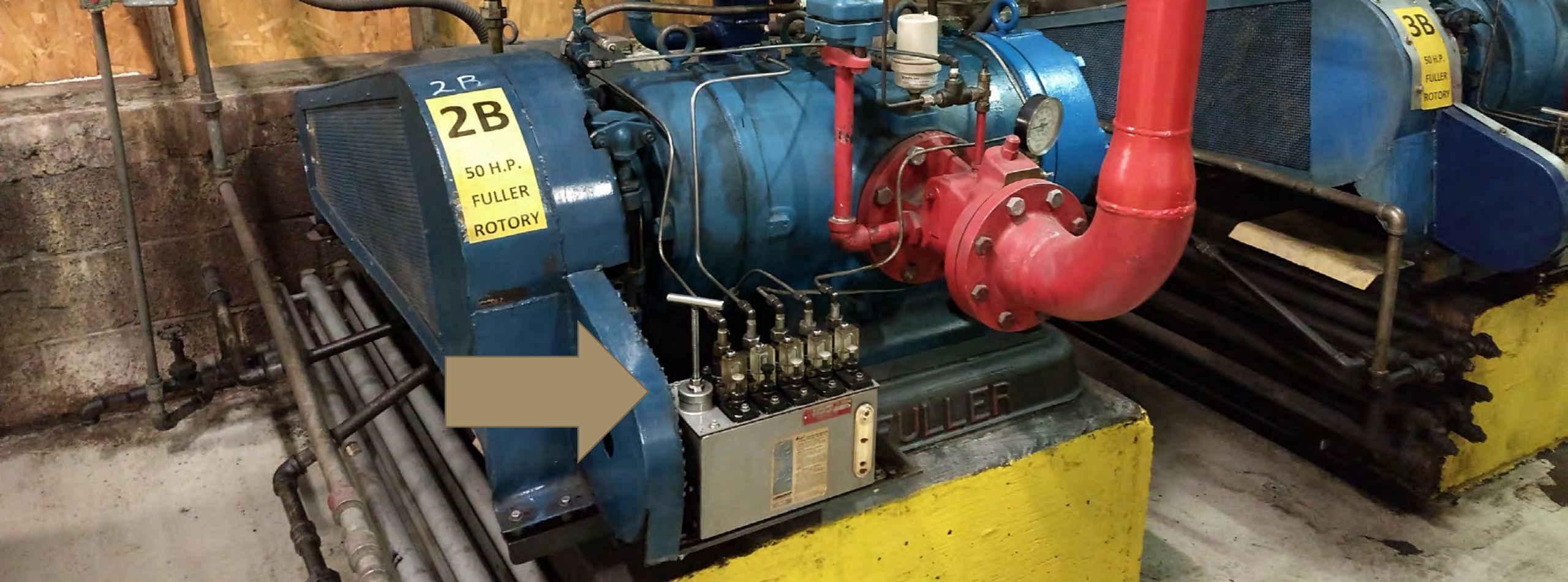
Verify oil levels are
adequate





DAILY INSPECTIONS

Check for oil leaks



DAILY INSPECTIONS

Check lubricator oil level and drip rate

DAILY INSPECTIONS

Check compressor for
unusual vibration



WEEKLY INSPECTIONS

Check shaft seal drip rate



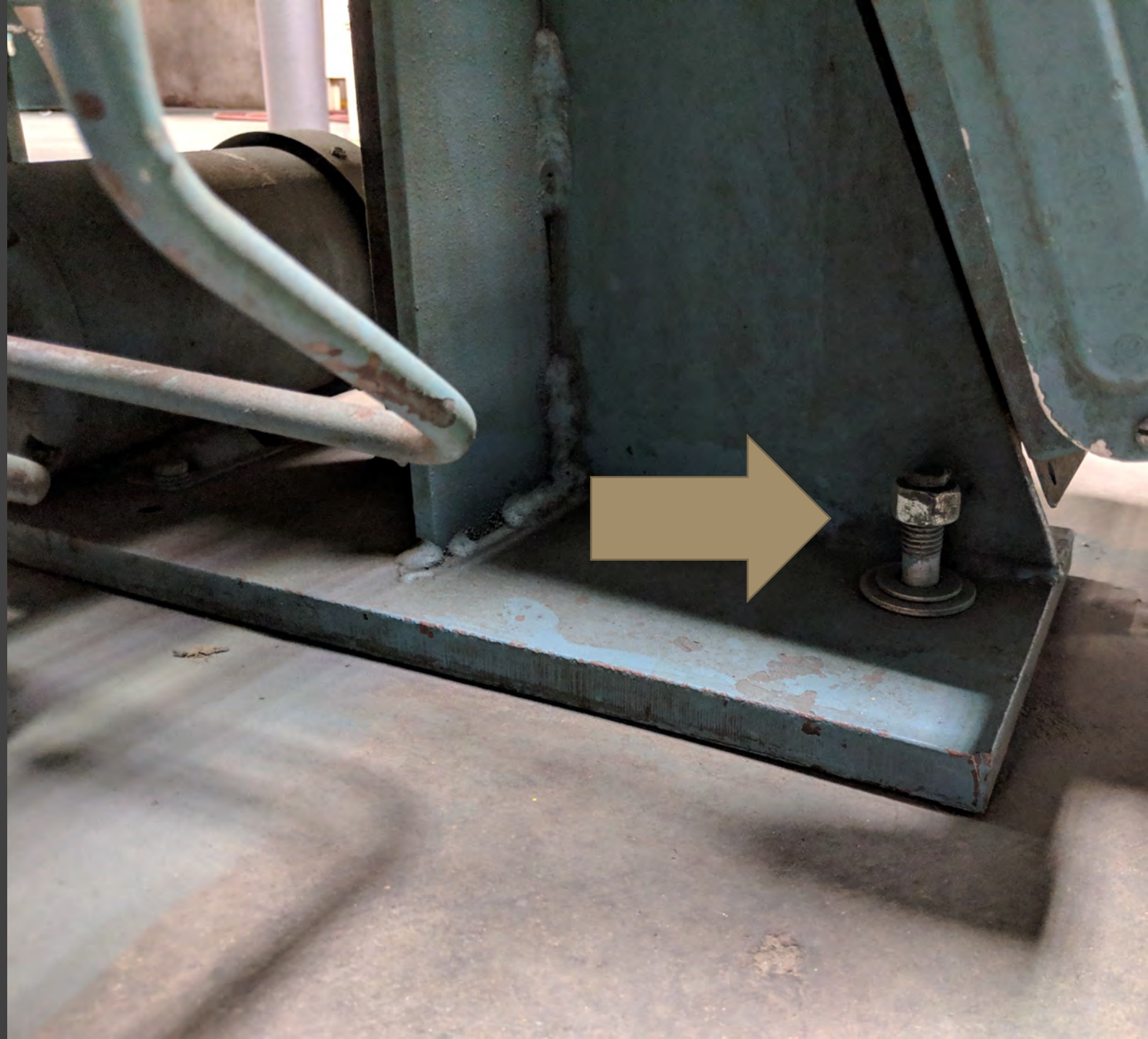
ANNUAL INSPECTIONS

Check that foundation is
solid



ANNUAL INSPECTIONS

Check mounting bolts for
tightness





ANNUAL INSPECTIONS

Visually inspect metal surfaces for pitting or surface damage

ANNUAL INSPECTIONS

Visually inspect coupling for wear



ANNUAL INSPECTIONS

Visually inspect starter
connections and
associated timers and
relays





ANNUAL INSPECTIONS

Inspect operation of oil heaters

MONTHLY INSPECTIONS

Inspect operation of
unloader



ANNUAL INSPECTIONS

Inspect alignment of motor drive shaft



ANNUAL TESTS

Test low suction pressure
cutout





INLET OIL
Inlet Oil Temp
Lower 90.0 °F
OIL SEPARATOR
Oil Separator Temp
Upper 170.0 °F
Oil Separator Temp
Lower 65.0 °F
DISCHARGE
Discharge Pressure
Maximum 180.0 Psi
Discharge Temp
Upper 190.0 °F

COMPRESSOR CONTROL



ANNUAL TESTS

Test high discharge pressure cutout

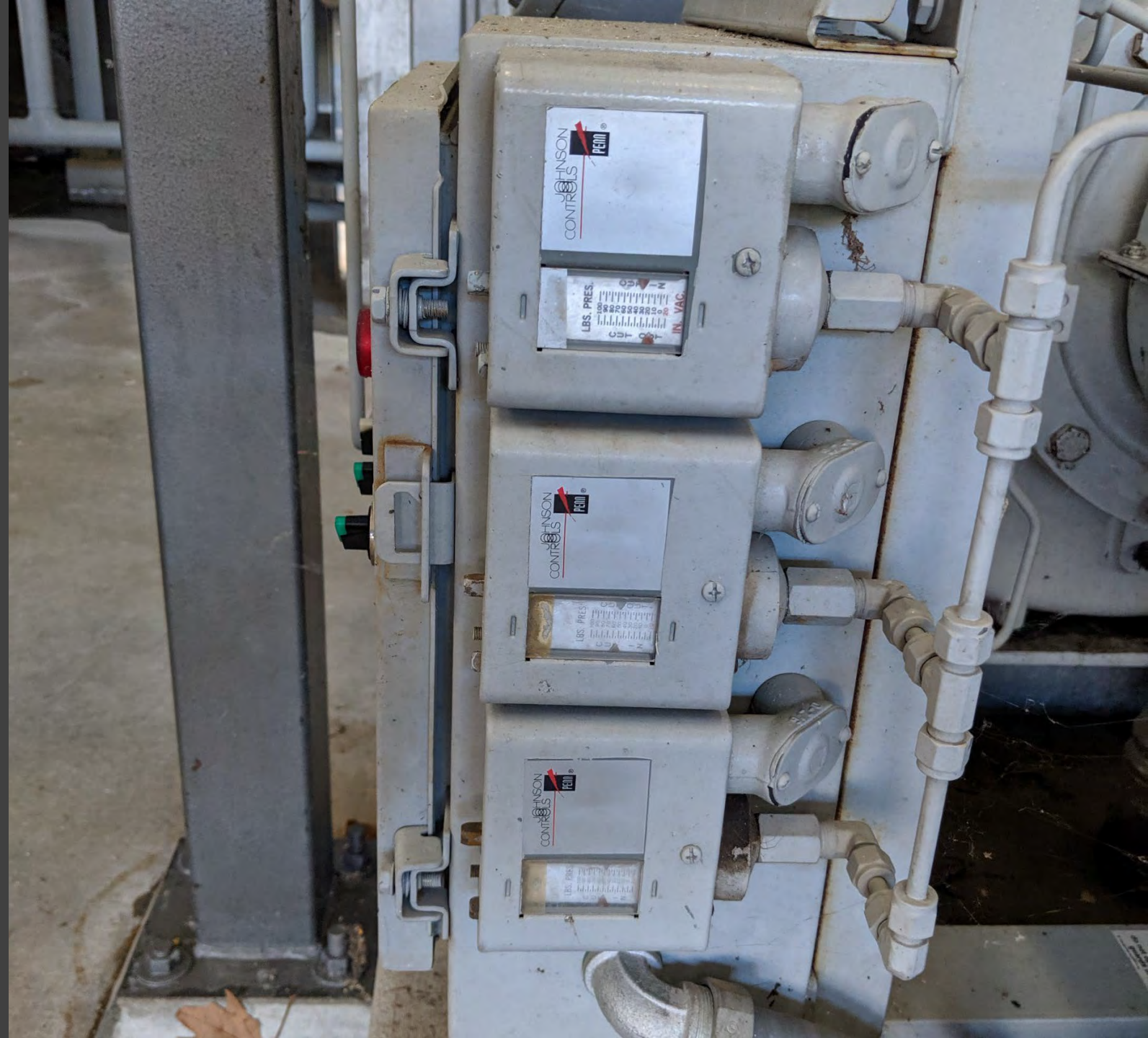


ANNUAL TESTS

Test high discharge temperature cutout

ANNUAL TESTS

Test low oil pressure
cutout



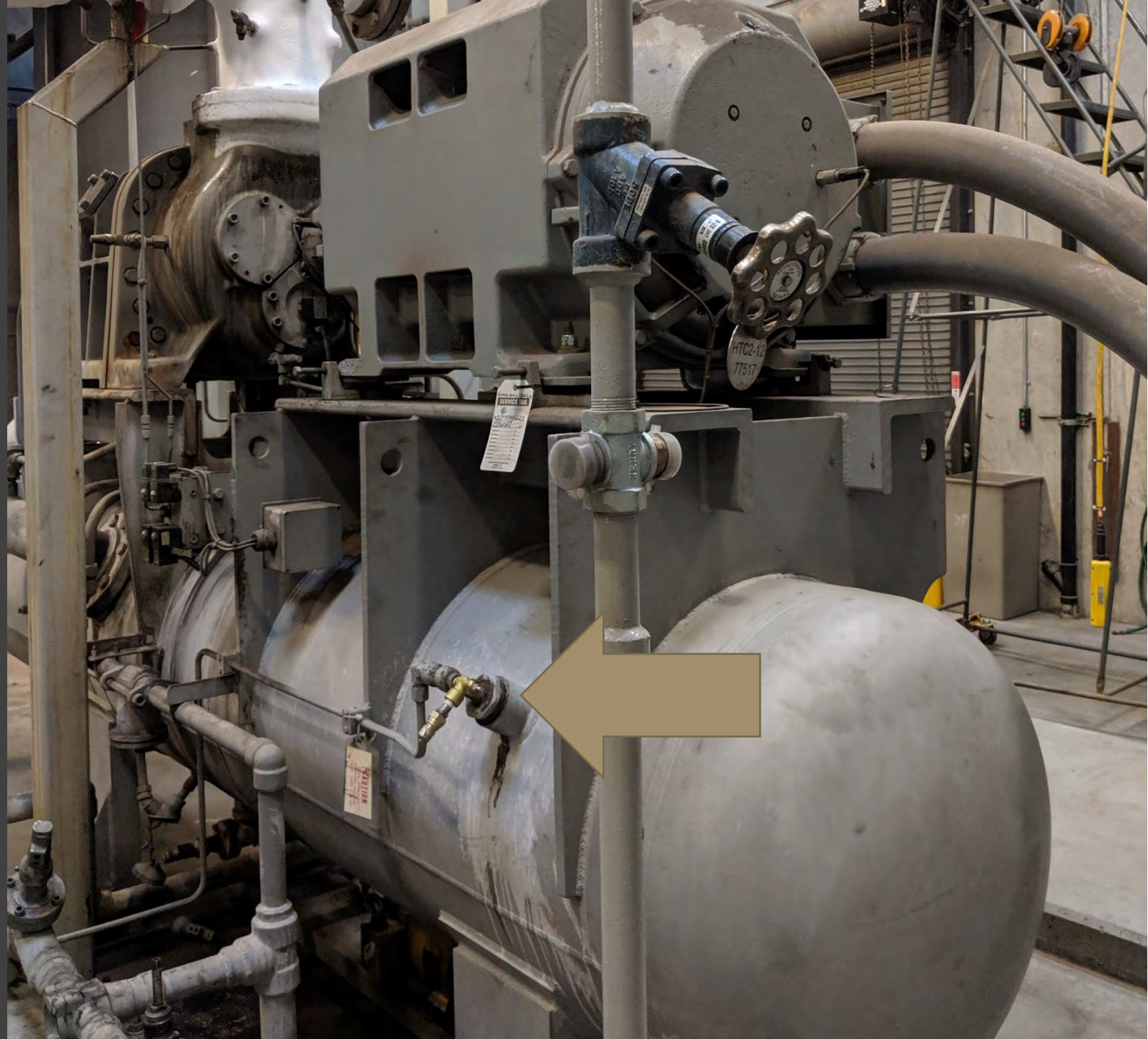
ANNUAL TESTS

Test high liquid level
cutout



MAINTENANCE

Add oil (as needed)



MAINTENANCE

Change oil filter (as indicated by ΔP , runtime hours, oil analysis)



MAINTENANCE

Clean external oil pump
(5-Years)



MAINTENANCE

Align external oil pump
shaft (5-years)





MAINTENANCE

Change oil (oil analysis, runtime, or annual)

MAINTENANCE

Verify coupling bolts are tight (annual)



MAINTENANCE

Replace shaft seal (as needed)



MAINTENANCE

Measure (hot)
compressor-motor drive
shaft alignment (annual)





MAINTENANCE

Lubricate compressor and external oil pump electric motor bearings (semi-annual)

MAINTENANCE

Remove electrical connection box and check motor leads and insulation (annual)



Normal **New Event - See The Event Log** COMPRESSOR 1
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 10.20.30.21
 10/17/2016 08:27:41

Home Alarms Login

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Oil	145.9 PSIG	130.4 °F	
Separator		166.4 °F	
Filter Differential	2.9 PSI		

Motor Amps	597 AMPS	Motor Recycle Delay	00:00
Motor % FLA	90.0 %	Motor Run Hours	248 HRS
Motor Kilowatts Est.	438 kW		

Capacity Management

Capacity Control Setpoint
 Mode 1 5.0 PSIG
 Actual 5.3 PSIG

Compressor

Compressor Running

Capacity Slide Idle 99.9 %
 Volume Slide Idle 4.48

Compressor Capacity Volume

Stop

System Operating Values [Select Data](#)

MAINTENANCE

Verify integrity of control power (annual)



MAINTENANCE

Verify integrity of starter connections (annual)

MAINTENANCE

Calibrate pressure and temperature cutout switches (annual)

Micro III

ALARM PARAMETERS

INLET OIL	
Inlet Oil Temp	
Lower	90.0 °F
OIL SEPARATOR	
Oil Separator Temp	
Upper	170.0 °F
Oil Separator Temp	
Lower	65.0 °F
DISCHARGE	
Discharge Pressure	
Maximum	180.0 Psi
Discharge Temp	
Upper	190.0 °F

COMPRESSOR CONTROL

STOP	SHUT-DOWNS	PWR FAIL RESET	AUTO
OIL PUMP	ALARMS		HOLD

CHANGE DISPLAY	↗
←	EDIT
CLEAR	↘

7	8
4	5



MAINTENANCE

Inspect for rotor axial play in motor driven rotor shaft (annual)

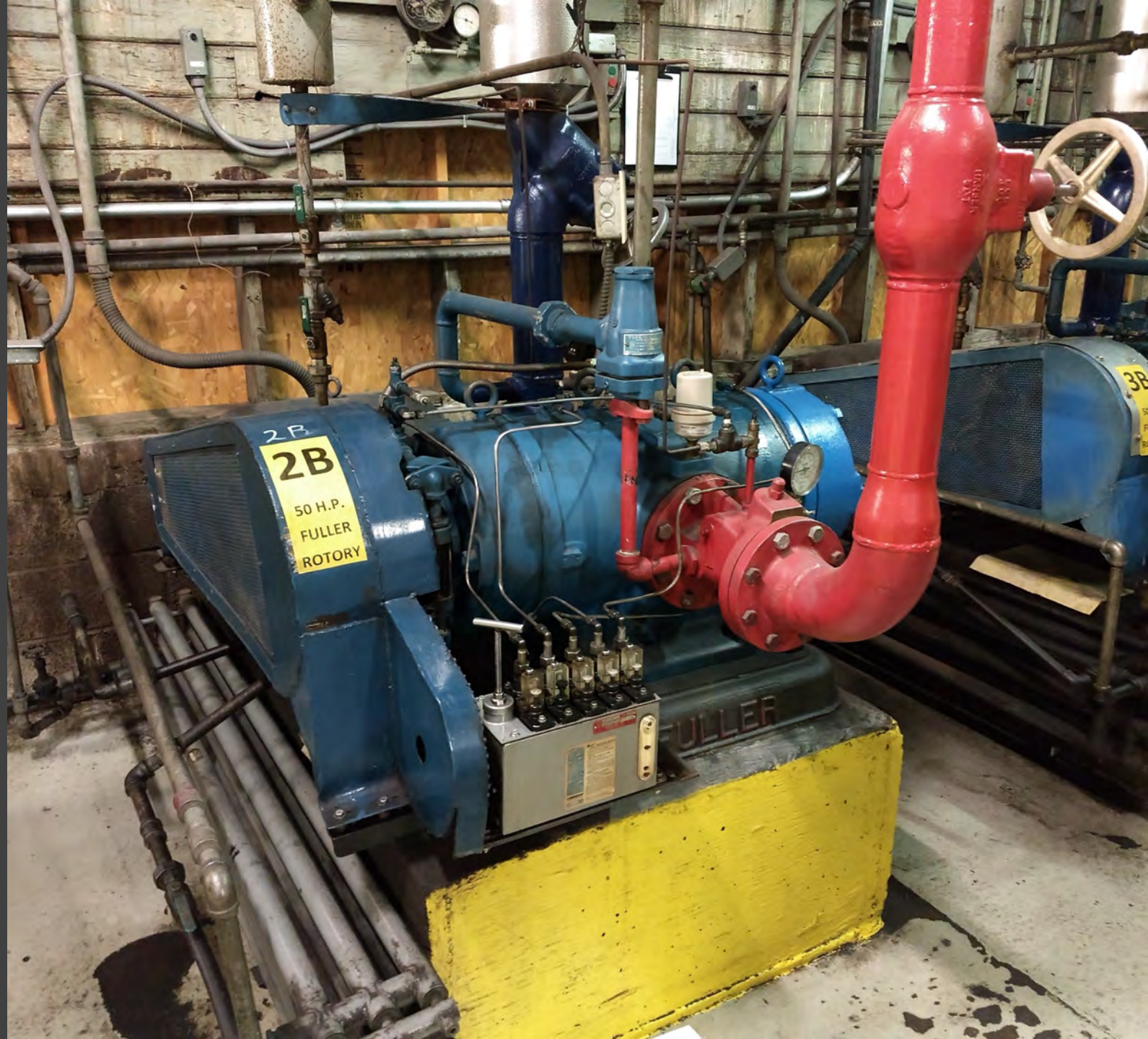
MAINTENANCE

Inspect pistons, rings, and plate valves (5-years)



MAINTENANCE

Inspect vanes (5-years)



MAINTENANCE

Check belt tension
(annual)



MAINTENANCE

Check pulley hub connections (annual)



MAINTENANCE

Check electrical wiring for hot spots (annual)



Normal **New Event - See The Event Log** COMPRESSOR 1
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Filter Differential	2.9 PSI		

Motor Amps	597 AMPS	Motor Recycle Delay	00:00
Motor % FLA	90.0 %	Motor Run Hours	248 HRS
Motor Kilowatts Est.	438 kW		

System Operating Values [Select Data](#)

Capacity Management

Capacity Control Setpoint
 Mode: [] 5.0 PSIG
 Actual 5.3 PSIG

Compressor

Compressor Running

Capacity Slide Idle 99.9 %

Volume Slide Idle 4.48

Compressor Capacity Volume

[] [] []

MAINTENANCE

Calibrate motor current transducer (annual)

Normal **New Event - See The Event Log** COMPRESSOR 1
 10.20.30.21
 10/17/2016 08:27:41

Control : Suction Pressure
 Setpoint : 5.0 PSIG - Actual : 5.3 PSIG

Home Alarms Login

Contacts

Package Operating Values

	Pressure	Temperature	Superheat
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Filter Differential	2.9 PSI		

Motor Amps	597 AMPS	Motor Recycle Delay	00:00
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Motor Kilowatts Est.	438 kW		

Capacity Management

Capacity Control Setpoint
 Mode 3 5.0 PSIG

Actual 5.3 PSIG

Compressor

Compressor Running

Capacity Slide Idle 99.9 %

Volume Slide Idle 4.48

Compressor	Capacity	Volume

System Operating Values [Select Data](#)

MAINTENANCE

Calibrate capacity/volume slide valve (annual)

**IIAR 6 Record Keeping Requirements
ANSI/IIAR 6-2019 §5.3.3**

**PSI Documentation Requirements
Title 8 CCR §5189(d)**

Refrigeration flow drawings

Block flow diagram
P&ID

Defined operating limits

Safe upper and lower limits for process variables such as temperatures, pressures, flows, levels and/or compositions

Safety system functional description

Safety systems (such as interlocks, detection and suppression systems, etc.)

Relief valve list with PRV manufacturer, PRV model number and set pressure, and where applicable, the three-way valve manufacturer and model number;

Relief system design and design basis

Ventilation system functional description

Ventilation system design

Installation, operation, and maintenance manuals;

Materials of construction

Manufacturer data reports for all pressure vessels;

Materials of construction

Equipment list

P&IDs

Record Keeping Requirements [§5.3]

OPERATING LIMITS

Design Pressure

The ammonia refrigeration system is divided into high and low sides. All components on the high-side of the system have a design pressure of 250, 300, or 400 psig. All components on the low-side of the system have a design pressure of 150 or 300 psig.

Consequence of Exceeding Design Pressure

- Compressors will shut down on high pressure cutout
- Emergency Pressure Control System (EPCS) will activate
- Pressure relief valves may lift
- Vessel may rupture if all safeties previously listed fail

Normal Discharge Pressure

The normal discharge pressure ranges from 120 psig - 200 psig based on ambient conditions and refrigeration system load patterns.

Consequence of Exceeding Normal Discharge Pressure

- Compressors will shut down on high pressure cutout
- Emergency Pressure Control System (EPCS) will activate
- Pressure relief valves may lift

Consequence of Deviating Below Normal Discharge Pressure

- Difficulty supplying liquid to evaporators and liquid injection cooled compressors

OPERATING LIMITS

FORM U-1A MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS (Alternative Form for Single Chamber, Completely Shop or Field Fabricated Vessels Only) As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1

Manufactured and certified by Industrial Service & Fabricators, Inc., 1425 South Burleson Boulevard, Burleson, Texas USA 76028
(Name and address of manufacturer)

Manufactured for California Controlled Atmosphere, 39138 Road 56, Dinuba, CA 93618
(Name and address of purchaser)

Location of installation Columbine Vineyards, 33777 Cecil Avenue, Delano, CA 93215
(Name and address)

Type: Vertical tank 13-10137 --- 10096-35 Rev. 1 97
(Horiz. or Vert. tank) (Mfg's serial No.) (CRN) (Drawing No.) (Nat'l Bd. No.)

The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1, 2010
construction, and workmanship conform to ASME Rules, Section VIII, Division 1 2010
Year

to '11 ---
Addenda (Date) Code Case Nos.

Shell SA-240-304 0.250" 0 3' 0" OD
Mat'l (Spec. No. Grade) Nom. Thk (in.) Corr. Allow (in.) Diam., I.D. (ft. & in.)

Seams: Wld., Dbl. Butt None 70% --- --- Wld., Sngl. Butt, Type 2
Long (Welded, Dbl, Sngl, Lap, Butt) R.T. (Spot or Full) Eff. (%) H.T. Temp. (oF) Time (hr) Girth (Welded, Dbl, Sngl, Lap, Butt) R.T. (Spot or Full)

Heads: (a) Material SA-240-304 (b) Material ---
(Spec. No., Grade) (Spec. No., Grade)

	Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Dia.
(a)	Top, Bottom	0.1875"	0	---	---	2:1	---	---	
(b)									

If removable, bolts used (describe other fastenings)

MAWP 150 0 psi. at max temp. 200
(internal) (external) (internal)
(Mat'l Spec. No., Grade, Size, No.)

SAFETY SYSTEMS

1. Ammonia Detection System

There are three ammonia sensors installed at

Detector Location	Manufacturer	Model	Serial Number
South Machinery Room Wall	Hansen	HEC4-N250	S12647D
West Machinery Room Wall	Hansen	HVSC4-N10K	1502400
Relief Vent Pipe	Hansen	HVSC4-N10K	R29232C

The detection system is interlocked with the refrigeration system controls as follows:

- Ammonia concentration monitors are installed inside and outside the machinery room to display the current concentration inside the room;
- If the ammonia concentration exceeds 25 ppm, a 38 lumen LED amber strobe and 97 dB audible alarm will be initiated inside and outside the room. In addition, the PLC will notify facility personnel;
- If the ammonia concentration exceeds 150 ppm, emergency ventilation will be activated and additional horn/strobe alarms outside the machinery room will be activated;
- If the ammonia concentration exceeds 1,000 ppm, the refrigeration machinery inside the machinery room will be de-energized and the fire department will be notified through the facility alarm system.



SAFETY SYSTEMS

2. Emergency Control Box

The Emergency Control Box was installed in accordance with Fire Code at the time of construction. The control box contains three (3) valves.

- Valve #1: High Side Discharge Valve
- Valve #2: Low Side Discharge Valve
- Valve #3: High to Low Pressure Control Valve

Opening Valve #1 will evacuate the process through the high pressure side of the system. Opening Valve #2 will evacuate the process through the low pressure side of the system. Opening Valve #3 will equalize the high and low pressure portions of the system.

The Emergency Control Box is seldom used in a refrigeration system, but has been installed for rare emergency situations.



Compressor Name	Oil Separator Name (See Vessel Tab)	Oil Separator Size		Relieving Capacity for Vessel lb/min	PRV Setting psig	Minimum Required Discharge lb/min	Pressure Relief Valve Selected	Relief Size	Relief Valve Capacity lb/min	Type of Assembly S/D	Number of Assemblies	Total Capacity lb/min	Date PRV Installed
		Dia	Length										
		in	ft										
Compressor 1	Oil Separator 1	20	6.9167	5.8	300	14.5	Henry 5601	1/2" x 1"	68.5	D	1	68.5	Feb-18
Compressor 2	Oil Separator 2	20	6.9167	5.8	300	14.5	Henry 5601	1/2" x 1"	68.5	D	1	68.5	Feb-18
Compressor 3	Oil Separator 3	20	9	7.5	250	17.5	Shank 812	1/2" x 1"	29.1	D	1	29.1	Feb-18

RELIEF VALVE LIST

VENTILATION SYSTEM

VENTILATION SYSTEM DESIGN

The purpose of a machinery room mechanical ventilation system is to effectively remove potential contaminated air from the machinery room space and expel that air to a safe outdoor location. Additionally, the machinery room ventilation assists in maintaining the room temperature below 104°F.

The mechanical ventilation system was retrofitted in the machinery room. The ventilation system consists of the following components:

The ventila

Emergency Ventilation Fan

Manufacturer: Airfoil Impellers

Model: TA3007503BD

S/N: S017116

Airflow: 16,916 CFM @ 1.0" SP

Motor: 7-½ HP, Explosion Proof

Fan Location: Mounted to the ground, outside the south machinery room wall. The fan discharges air vertically through a circular duct and damper which terminates above the roof.



PMC-E

EVAPORATIVE CONDENSERS

Easy to Install - Easy to Maintain

More Capacity
More Choices



Forced Draft, Axial Fan Models Available in Capacities from 124 to 1,408 Ammonia Tons!

PILOT OPERATED FIXED OR ADJUSTABLE LEVEL Size: 1/2" - 4"

For Ammonia (R-717) and Halocarbon Refrigerants

Features

- Pressure Rating: 300PSI (-20°F – +240°F)
- ASTM A536 Gr. 65-45-12 Ductile Iron Body and Bonnet
- Modulating Level through Metering Pilot
- Normally Closed
- Manual Lifting Stem
- Strainer Available
- Teflon Seat Disks are Replaceable

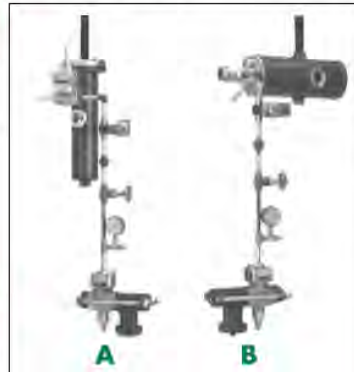
Description

The Phillips® Series 7015 Low Side valves are pilot-operated piston-type valves which meter the flow of liquid refrigerant to an evaporator or pressure vessel in response to liquid level requirements. The 7015 is controlled by a float valve which responds to changing requirements, providing a modulating control arrangement.

The 7015 valves are flanged and may be supplied with a mating strainer. A metering plug and spring are selected for specific operating conditions. A manual opening stem, for raising the metering plug off the internal port, and a replaceable PTFE seat disc are standard.

In fixed level applications, the 7015 is typically controlled by a 301E float valve. The 301E is mounted in a welded steel chamber, external to the vessel where the level is being controlled. The chamber is equipped with a Phillips® Level Eye® for visual indication of the liquid level. See Bulletin 301E. (A Series 300 float valve, which mounts internal to the vessel being controlled, will also serve as a pilot float. See Bulletin 300H.)

In adjustable level applications, the 7015 is controlled



A 7015 Valve with 101 Valve and Chamber Pilot Operated Level Control (Adjustable Level)

B 7015 Valve with 301E Valve and Chamber Pilot Operated Level Control (Fixed Level)

Design Function

The 7015 valve is actuated by controlling the pressure above the internal piston. A drop in liquid level, detected by the pilot float valve, reduces pressure in the pilot line as the pilot float orifice opens. This drop in pressure causes the 7015 piston to rise and open slots in the metering plug. Conversely, a rise in liquid level closes the pilot float orifice and increases the pressure in the pilot line. This moves the 7015 piston and metering plug toward the closed position.

Flow in the pilot line is from the top of the 7015 to

RWF II

ROTARY SCREW COMPRESSOR UNITS

ALL REFRIGERANTS

MODELS
100 through 1080



THIS MANUAL CONTAINS RIGGING, ASSEMBLY, START-UP, AND MAINTENANCE INSTRUCTIONS. READ THOROUGHLY BEFORE BEGINNING INSTALLATION. FAILURE TO FOLLOW THESE

IOMS

1. Manufactured and certified by Industrial Service & Fabricators, Inc., 1425 South Burleson Boulevard, Burleson, Texas USA 76028
(Name and address of manufacturer)

2. Manufactured for California Controlled Atmosphere, 39138 Road 56, Dinuba, CA 93618
(Name and address of purchaser)

3. Location of installation Columbine Vineyards, 33777 Cecil Avenue, Delano, CA 93215
(Name and address)

4. Type: Vertical tank 13-10137 --- 10096-35 Rev. 1 9799 2013
(Horiz. or Vert., tank) (Mfg's serial No.) (CRN) (Drawing No.) (Nat'l Bd. No.) (Year built)

5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction, and workmanship conform to ASME Rules, Section VIII, Division 1 2010
Year

to '11 --- ---
Addenda (Date) Code Case Nos. Special Service per UG-120(d)

6. Shell SA-240-304 0.250" 0 3' 0" OD 6' 0"
Mat'l (Spec. No. Grade) Nom. Thk (in.) Corr. Allow (in.) Diam., I.D. (ft. & in.) Length (overall) (ft. & in.)

7. Seams: Wld., Dbl. Butt None 70% --- --- Wld., Sngl. Butt, Type 2 None 65% 1
Long (Welded, Dbl, Sngl, Lap, Butt) R.T. (Spot or Full) Eff. (%) H.T. Temp. (oF) Time (hr) Girth (Welded, Dbl, Sngl, Lap, Butt) R.T. (Spot or Full) Eff. (%) No. of Courses





DATA REPORTS

EQUIPMENT LISTS

Filter:

Advanced Search:

Filter by type ▼

Ammonia Diffusion Tank	
Compressor 1	
Comp 1 High Discharge Temperature Cutout	
Comp 1 High Pressure Cutout	
Comp 1 Low Pressure Cutout	
Comp 1 Oil Pressure Cutout	
Oil Cooler 1	
Oil Separator 1	
OS 1 Relief Valve 1	
OS 1 Relief Valve 2	

Gauge Board	+40°F Suction Pressure	50 - 70 psig							
	+25°F Suction Pressure	33 - 45 psig							
	Discharge Pressure	120 - 180 psig							
Compressor 1 (+40°F) GEA 195GMX	Running	Yes/No							
	Run Time	Hours							
	Oil Level	Top sight glass should be 1/2 full	○	○	○	○	○	○	○
	Alarms	Yes/No - check microprocessor							
	Suction Temperature	34°F - 47°F							
	Suction Pressure	50 - 70 psig							
	Discharge Temperature	155°F - 195°F							
	Discharge Pressure	120 - 180 psig							
	Oil Temperature	120°F - 170°F							
	Oil Filter Pressure	60 psig - 90 psig							

OPERATIONAL LOG

AMMONIA PURITY



Submit Form

Print

Service Division
Phone (877) 231-6406
Fax (209) 545-1660

To be completed after testing each sample of ammonia from the system:		
(Sample 1)	Vessel description: Recirc PP1	Ammonia level in vessel (%): 25
Vessel pressure: 25 pounds	Water quantity (ml): .02	Water Percentage: 0.171832
(Sample 2)	Vessel description:	Ammonia level in vessel (%):
Vessel pressure:	Water quantity (ml):	Water Percentage:
(Sample 3)	Vessel description:	Ammonia level in vessel (%):
Vessel pressure:	Water quantity (ml):	Water Percentage:
(Sample 4)	Vessel description:	Ammonia level in vessel (%):
Vessel pressure:	Water quantity (ml):	Water Percentage:
(Sample 5)	Vessel description:	Ammonia level in vessel (%):
Vessel pressure:	Water quantity (ml):	Water Percentage:
(Sample 6)	Vessel description:	Ammonia level in vessel (%):
Vessel pressure:	Water quantity (ml):	Water Percentage:
(Sample 7)	Vessel description:	Ammonia level in vessel (%):
Vessel pressure:	Water quantity (ml):	Water Percentage:
(Sample 8)	Vessel description:	Ammonia level in vessel (%):
Vessel pressure:	Water quantity (ml):	Water Percentage:
(Sample 9)	Vessel description:	Ammonia level in vessel (%):

Type of Record	Retention Duration
Daily Inspection Records	Most current 12 months
Daily Testing Records	Most current 12 months
Daily Maintenance Records	Most current 12 months
Annual Inspection Records	Most current 5 years
Annual Testing Records	Most current 5 years
Annual Maintenance Records	Most current 5 years
Five Year Inspection Records	Two (2) most current
Five Year Testing Records	Two (2) most current
Five Year Maintenance Records	Two (2) most current
Ten Year Maintenance Records	Two (2) most current

Type of Record	Retention Duration
Engineering Design Documentation	Life of the process
Pressure Vessel U-1, U-1A, U-3, UM Reports	Equipment life
Log (Operator Transfer of Information)	Most current 12 months
Secondary Coolant Records	Most current 12 months
Ammonia Refrigerant Records	Most current 5 years
Refrigeration Oil Records	Most current 5 years
Lubrication Records	Most current 5 years
Pressure Relief Valve (PRV) Records	PRV life
Current System Records listed in Section 5.3.3	Life of the process
Instrument and Device Testing and Calibration	Most current 5 years

Type of Record	Retention Duration
Engineering Design Documentation	Life of the process
Pressure Vessel U-1, U-1A, U-3, UM Reports	Equipment life
Log (Operator Transfer of Information)	Most current 12 months
Secondary Coolant Records	Most current 12 months
Ammonia Refrigerant Records	Most current 5 years
Refrigeration Oil Records	Most current 5 years
Lubrication Records	Most current 5 years
Pressure Relief Valve (PRV) Records	PRV life
Current System Records listed in Section 5.3.3	Life of the process
Instrument and Device Testing and Calibration	Most current 5 years



Resource Compliance

126 W. Ventura Ct.,
Kingsburg, CA 93631

resourcecompliance.com

(559) 591-8898