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?





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

Bulletin No. 110 3/93

Guidelines for:

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

> International Institute of Ammonia Refrigeration

Bulletin No. 116 10/92

Guidelines for:

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



			PRESSURE VESS
			PRESSURE VESS
Plant Owner			
Address			
Contact		laxenone	
Inspective		Date	
Pressure Vessel			
Vesael Cocation			
Vessel Identification Mark/No.			
Application			
High Phonaire Sticework	(interconnect	□ Accimianor	13 Die Pee
Pump Secretar Line Serge	☐ Pump Documer Hope Semp.	Chur (Degree)	
Application Data			
Normal Operating Pressure grays		temperature (*)	
Vessor Stre (Dam. x 1/1/c 6)		Normal Legal Lewis (II)	
Norma Ammonia Inventory (cude			
Design Capacity (Specify Planger	tren Surge Wr. TVC exc.r.		-
Vessel Nameplate Data			
Manufacturer, Name, Moder, Siero	No.		
Year Manufactured		Mor. Design Working Prese	un grap
Maximum Altowable Prinsure (pri	9	N.CO.	
Mirmum Design Mixus Temperatu	26 (9)	At gregit	
Test Pressure Appries (exig)			
National Board No.		ASMI Controlition Stemp?	Die Die
Safety Relief Valve Dat			
Non Class Crange C	None		
Manufacturer, Name, Model, Seru	No.		
Year Manufactures or Recording		ASME Sear Unprinser? ()	No. 11No
Pressure Setting (psigl)		Capacity (bis arrive):	
NAME OF TAXABLE PARTY.	II Date	PpeSize Clinic	O Dylline
Valve Connections: 15 aug			
	ecto fermioni () Yes () No		

PRISSURE VESSUES			© Number
	24.5	Recommended Action/Comments	Safety Targe Status Cute
Requirement Recommendation () Namepater in place and complete?	Conforms	Actions, onyments	Status Cute
I Operating within institutions	12.00		
1) Maximum pressure?	Dw Ob		
2 Minute Semprished	06.06		
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Unideniary day report on fact	City City		
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27 th technical shallo report on Sec ²	Oto Oto		
/ Itemate	1		-
11 Proper light?	0% OW		
7) Cornet setting?	Die Die		
1) Capacity consc?	□% □%		
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s) Poing to larramation correct?	Chi Chi		
6) Reset valve replaced or receirsted arthre last			
5 years of sensor?	C% C%		
r) ASME seet unbroken?	Otto Cito		
i future insur liquid level indicites (sight game).			
1) Protected from traffic traversis?	DW DW		
2) 167 (wets?	29 29		
I) HAVE STANK SHART YARVIS?	Div. Dk		
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insulation condition (check one) () to super return	SP RIKS TINGER	mbol tephon lever () lepus	Inc. vapor relation make
© Pet Installed			

Bulletin No. 109 10/97

Guidelines for:

IIAR Minimum
Safety Criteria for
a Safe Ammonia
Refrigeration
System



Bulletin No. 110 3/93

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
- 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
- The manufacturer's recommendations on replacement frequency of pressure relief devices shall be followed.

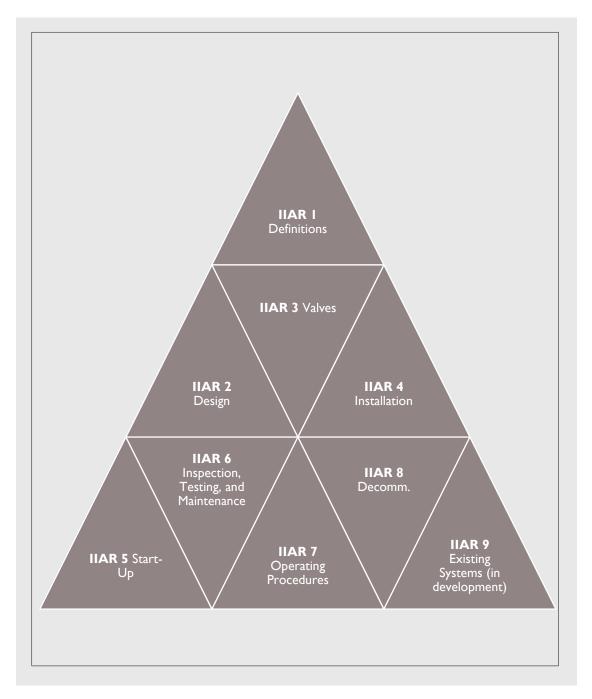
Exception: Relief devices discharging into another part of the closed-loop refrigeration system are not subject to the relief valve replacement practices.

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

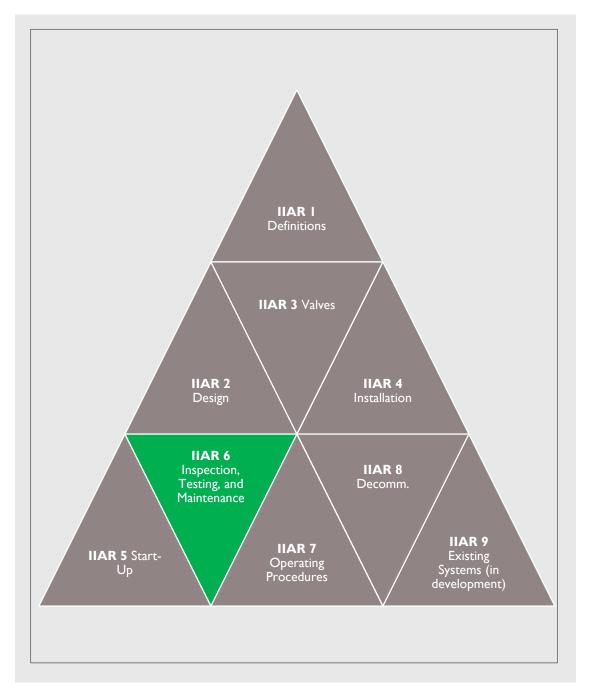
IIAR Bulletins

- IIAR Bulletin No. I 10 §6.4.2 [emphasis mine]:
- The system <u>should</u> be checked regularly for the presence of non-condensable gases which <u>should</u> be purged as necessary from the receiver(s) and/or condenser(s), <u>preferably</u> into a noncondensable gas remover or purger but <u>alternatively</u> into water. Where an automatic purger is fitted, its correct operation <u>should</u> be monitored. If there is a large accumulation of noncondensable gases the reason <u>should</u> be investigated and the cause <u>should</u> be corrected.









2 – Definitions

Part I –

General

- Reference Standards

- Program Administration

General

Compressors

7 – Pumps

3 – Condensers

– Evaporators

10 - Vessels

11 – Piping

Safety Systems

Overpressure Protection Devices

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14 - Purgers

Ammonia and Secondary Coolants

2

- Explanatory Material

B – Safety Checklists

C - Water Contamination

Avoiding Abnormal Pressure/Shock

E – Risk-Based ITM

F - References

Part 3 Appendices

Part 2 – Program Requirement

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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 I –

Purpose, Scope, and Applic.

2 – Definitions

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Part 3 Appendices

General

Program Administration

General

- Compressors

7 – Pumps

Condensers

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Reference Standards

10 - Vessels

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Ammonia and Secondary Coolants

2

Overpressure Protection Devices

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Safety Systems

– Explanatory Material

8 - Safety Checklists

Avoiding Abnormal Pressure/Shock

C - Water Contamination

- Risk-Based ITM

F - References

Type of Purging:

A	mmonia Refriger		nspection Checklist
		PURGERS	
Locatio	n:		ID/Tag No.:
	er:		
Addres	· ·		
	±		Phone:
Inspecto Automatic Refrigerated			Date:
Manual Refrigerated			
Manual, Non-Refrigerate			
Equipment Data and Li	mits:		
Manufacturer:		odel #:	Serial #:
Year Mfg.:		* 1 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Pressure (psig):
Operating (psig /°F):	1	Norma	l Liquid Level:
Total Internal Vol:	Cu. Ft.	Normal Ammonia In	eventory (lbs.):
Material:	Carbon Steel, Stainl	ess Steel, Aluminu	m. Other:
Level Indicator Type:	☐ None, ☐ Armored Bul ☐ Level Column Only, ☐		n w/Bullseye, ☐ Flat Armored, Techni Level
Relief Valve Data:	□ N/A		
Manufacturer:	Mo	del:	Year Installed:
Assembly:	☐ Dual w/changeover valve	e Single Typ	oe of Relief Valve: Internal, External
Pressure Setting (psig):		Capacity (lb	s. 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:	
Durge Doint		Durge Point	

Ammonia Refrigeration Safety Inspection Checklist AMMONIA ABSORPTION SYSTEM Location: ID/Tag No.: Facility Owner: Phone: Inspector: Date: Equipment Data and Limits: Manufacturer: Serial Number: Listed Certification: Design Temp. (°F): 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: ☐ Liquid-Vapor, Type Liquid: ☐ Solid-Vapor, Type Solid: ☐ Absorbent Medium: Design Temperature (°F): Operating Temperature (°F): Generator (Desorber) Data: Generator Heat Source: Gas, Type: Blectric, Waste Heat, Fuel Used: Design Temperature (°F): Operating Temperature (°F): Rectifier Data: Material of construction: Steel, Stainless Steel, Aluminum, Other: Operating Temperature (°F): Design 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: Contact: Inspector: Date: Ammonia Detector Data: (Use as many copies of this sheet as necessary to document all detectors) Catalytic Bead, Electro-chemical, Opto-acoustic, Semi-conductor, Detector Type: Rupture Disc. Infrared, Other: Manufacturer: Model: Alarm Levels (ppm): Quantity: Location(s): ☐ Catalytic Bead, ☐ Electro-chemical, ☐ Opto-acoustic, ☐ Semi-conductor, Detector Type: Infrared, Rupture Disc, Other: Manufacturer: Alarm Levels (ppm): Location(s): ☐ Catalytic Bead, ☐ Electro-chemical, ☐ Opto-acoustic, ☐ Semi-conductor, Detector Type: Infrared. Rupture Disc. Other: Alarm Levels (ppm): Manufacturer: 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: Serial Number(s): Manufacturer: Model: Air Flow (cfm): ID/Tag Number(s): Year Mfg.: Material: Galv. Steel, Stainless Steel, Aluminum Belt Qty: Belt Size: Intermittent (Temperature Control) Ventilation Fan Data: Quantity: Serial Number(s): Manufacturer: Model: Air Flow (cfm): Year Mfg.: ID/Tag Number(s): Material: ☐ Galv. Steel, ☐ Stainless Steel, ☐ Aluminum Belt Qty: Belt Size: Emergency Ventilation Fan Data: Quantity: Model: Serial Number(s): Manufacturer: ID/Tag Number(s): Air Flow (cfm): Year Mfg.: Material: Galv. Steel, Stainless Steel, Aluminum Belt Qty: Belt Size:

	Ammonia Refrigeration S	afety Inspection Checklist	
	GENERAL	LSYSTEM	
Location:		ID/Tag No.:	
Facility Owner:			
Address:			
Contact:		Phone:	
Inspector:		Date:	

		ral system component	Safety	Recommended Action.	
Inspect	ion Items	Conforms	Status	or Comments	Target Date
a) Equipment labe legible per AN		Yes No No N/A			
b) All components ammonia?	suitable for	Yes No No N/A			
c) Operating within	in limits?	Yes 🗌 No 🔲 N/A 🗌			0.1
d) Fasteners tight, anchored, and s		Yes 🗌 No 🗎 N/A 🗍			
e) Safe access for and Maintenand	Inspection, Testing ce (ITM)?	Yes 🗌 No 🗎 N/A 🗎			
f) Free of excessiv	ve ice buildup?	Yes 🗌 No 🗌 N/A 🗌			
g) Free of abnorma	al sounds/vibration?				
h) Free of ammoni	ia leaks?	Yes No No N/A			
 i) Adequate protection hazards? 	ction against traffic	Yes No No N/A			
gauges and/or to	nure/temperature ransducers are ctioning adequately?	Yes 🗌 No 🗎 N/A 🗎			
k) Oil pots installe oil must be drai	ed at all points where ned?	Yes No No N/A			
l) Oil drain valves	s are self-closing?	Yes 🗌 No 🔲 N/A 🗌			
installing/se b. Approximat ammonia?	plays: ess and telephone of rvicing contractor? e quantity of lentity and amount?	Yes No No N/A			
n) Aisles in machi marked and clea	nery room clearly ar of obstructions?	Yes 🗌 No 🗌 N/A 🗍			
o) There is more the machinery room	han one exit from the n?	Yes No No N/A			
has required pla Additional princ	nery room door and acarding per IIAR 2? cipal machinery auxiliary machinery re required	Yes No No N/A			



		ID Number:
	AIR-C	OOLING EVAPORATORS
Plant Owner:		
Address:		
Contact:	Telephone:	
Inspector;	Date:	
Air Cooling Evaporators		
Air Cooling Evaporator Location:		
Air Cooling Identification Mark/No.:		
Application	Type of Refrigerant F	eed
☐ Blast Freezer ☐ Storage Freezer	☐ Liquid Recirculation	☐ Dry Expansion (DX)
☐ Process Room ☐ Dock	☐ Flooded (Surge Drum)	
☐ Storage Cooler	Other (Describe):	
Other (Describe):	_	
Application Data Tube and Fin Material:	aluminum	
Design Room Air Temperature (*F):	Normal Refrigerant Temperatur	e (°F);
Design Capacity (TR):		
Total Internal Vol. (cubic ft):		
Normal Ammonia Inventory (Volume/Weight): □ cubic ft:		
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 (np):
IIAR Bulletin No. I	no FLA (amps):	Phase: [1 []
IIAN Dulleull 140. I	Belt size and number:	

		The second second second	and the second s	
		AIR-COOLING	EVAPORATOR	
Location:			ID/Ta	g No.:
racinty Owner:				
Address:				
Contact: Inspector:			Phone Date:	
A CONTRACTOR	T. CD.C	T. I	Date:	
and the second second second	Type of Rea		Liquid Recirculation	(T F3)
#27 PC LC 1723	r	1 T	Liquid Recirculation	
			Flooded (Surge Drun	5 4-4 P. M. C. M.
4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		_	Direct Expansion (D)	A Proposition of the Parket of
Car e an annual			Ammonia Absorption	
	e)	5.3	Other (Describe)	E 100 CO
121002110		-1		
uipment Data and I	imits:	Model	Se	
anufacturer:	Limits:	Model:		rial Number:
anufacturer: ar Manufactured:	imits:	Model:	Design Pressure (psig	rial Number:
anufacturer:			Design Pressure (psig) Suction (psig /°F)	rial Number:
anufacturer: ar Manufactured: om Air Temp (°F):		Cu. Ft. Norm:	Design Pressure (psig Suction (psig /°F) al Ammonia Inventory (lbs.	rial Number:
anufacturer: ear Manufactured: eom Air Temp (°F): tal Internal Vol:		Cu. Ft. Norm:	Design Pressure (psig Suction (psig /°F) al Ammonia Inventory (lbs.	rial Number:
anufacturer: oar Manufactured: oom Air Temp (°F): stal Internal Vol: sbe and Fin Maternal:	Galv. Steel,	Cu. Ft. Norm:	Design Pressure (psig Suction (psig /°F) al Ammonia Inventory (lbs. ,	rial Number:
anufactured: ar Manufactured: som Air Temp (°F): stal Internal Vol: be and Fin Material: frost Type:	Galv. Steel,	Cu. Ft. Norm:	Design Pressure (psig Suction (psig /°F) al Ammonia Inventory (lbs. ,	rial Number:/):/):/]Stainless tube/Aluminum Fin
anufactured: ar Manufactured: com Air Temp (°F): stal Internal Vol: be and Fin Material: frost Type: n Motor Data:	Galv. Steel,	Cu. Ft. Norm: All Stainless Steel Water,	Design Pressure (psig, Suction (psig /°F) al Ammonia Inventory (lbs., Aluminum, Hot Gas, Other	rial Number:

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ID Number:

		AIR-C	OOLING EVAPORATORS
Plant Owner:			
Address:			
Contact:		Telephone:	
Inspector;		Date:	
Air Cooling Evapora	ators		
Air Cooling Evaporator Loca	itlon:		
Air Cooling Identification Ma	ark/No.:		
Application		Type of Refrigerant F	eed
Blast Freezer	Storage Freezer	Liquid Recirculation	☐ Ory Expansion (DX)
Process Room	☐ Dock	☐ Flooded (Surge Drum)	
Storage Cooler		Other (Describe):	
Other (Describe):			
Defrost Type: air	carbon steel		
Design Room Air Temperatu	re (°F):	Normal Refrigerant Temperatu	re (°F):
Total Internal Vol. (cubic ft):		-	
Normal Ammonia Inventory	(Volume/Weight):	:b:	
Air Cooling Evapora	ator Nameplate Data		
Manufacturer, Name, Model	, Seriai No.:		
Year Manufactured:		Design Pressure (psig):	
Fan Motor Namepla	ite Data		
Manufacturer, Name, Model	, Serial No., Year Manufactured:		
Frame Size:	Туре:	Speed (rpm):	Power (np):
MAR BU	lletin No. I	no FLA (amps):	Phase: [1 [3
Frequency (Hz):	1100111	Belt size and number:	

		AIR-COOLING	G EVAPORATOR	
Location:				g No.:
racinty Owner.				F177.04
Address:			12.1	
Contact:			Phone	
Inspector:	TCD .C	Carried Prints	Date:	-
	Type of Refi	0	A STATE OF	232 L S
But ACLETY A		Name and the same	Liquid Recirculation	
	r	_	Liquid Recirculation	
			Flooded (Surge Drun	** ***
C= 2 2 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			Direct Expansion (D)	X)
Process Room		. 🔲	Ammonia Absorption	ı System
	-			
	e)	. D - J	Other (Describe)	
Other (Describ ipment Data and I sufacturer:	2-0	Model:	-	nal Number:
ipment Data and I	2-0	-1	See	
ipment Data and L ufacturer:	2-0	-1	Se Design Pressure (psig	rial Number:
ipment Data and L nufacturer: r Manufactured:	limits:	Model:	Se Design Pressure (psig	rial Number:
ipment Data and L ufacturer: r Manufactured: m Air Temp (°F):	imits:	Model:	Se Design Pressure (psig) Suction (psig /°F) al Ammonia Inventory (lbs.)	rial Number:
ipment Data and I sufacturer: r Manufactured: m Air Temp (°F): ul Internal Vol:	imits:	Model: Cu. Ft. Norm All Stainless Stee	Se Design Pressure (psig) Suction (psig /°F) al Ammonia Inventory (lbs.)	rial Number:
ipment Data and I nufacturer: r Manufactured: m Air Temp (°F): il Internal Vol: e and Fin Material:	Galv. Steel,	Model: Cu. Ft. Norm All Stainless Stee	Se Design Pressure (psig, Suction (psig /°F, al Ammonia Inventory (lbs.) l,	rial Number:
ipment Data and L aufacturer: r Manufactured: m Air Temp (°F): al Internal Vol: e and Fin Material: rost Type:	Galv. Steel,	Model: Cu. Ft. Norm All Stainless Stee	Se Design Pressure (psig, Suction (psig /°F, al Ammonia Inventory (lbs.) l,	rial Number:
ipment Data and I nufacturer: r Manufactured: m Air Temp (°F): il Internal Vol: e and Fin Material: rost Type: Motor Data:	Galv. Steel,	Cu. Ft. Norm All Stainless Stee	Se Design Pressure (psig, Suction (psig /°F) al Ammonia Inventory (lbs.) l, Aluminum, Hot Gas, Other	rial Number:

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ID Number:

		AIR-U	OOLING EVAPORATORS
Plant Owner:			
Address:			
Contact:		Telephone:	
Inspector;		Date/	
Air Cooling Evaporator	rs		
Air Cooling Evaporator Location	0		
Air Cooling Identification Mark/N	ło.:		
Application		Type of Refrigerant F	eed
Blast Freezer	Storage Freezer	☐ Liquid Recirculation	☐ Dry Expansion (DX)
Process Room	☐ Dock	☐ Flooded (Surge Drum)	
Storage Cooler		Other (Describe):	
Other (Describe):			
Application Data Tube and Fin Material: car	rbon steel	aluminum	
		aluminum	
Tube and Fin Material: car	ter hot gas other	aluminum Normai Refrigerant Temperatu	re (*F).
Tube and Fin Material:	ter hot gas other	Normal Refrigerant Temperatur	re (*F):
Tube and Fin Material: car Defrost Type: alr wal Design Room Air Temperature (*) Design Capacity (TR):	ter hot gas other	Normal Refrigerant Temperatur	re (*F):
Tube and Fin Material: car Defrost Type: air wal Design Room Air Temperature (* Design Capacity (TR): Total Internal Vol. (cubic rt):	ter not gas other	Normal Refrigerant Temperatur Design Air Flow (CFM):	re (*F);
Tube and Fin Material: car Defrost Type: air wal Design Room Air Temperature (* Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Ammonia Inventory (Vol.	ter	Normal Refrigerant Temperatur Design Air Flow (CFM):	re (°F);
Tube and Fin Material: car Defrost Type: air wal Design Room Air Temperature (* Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Ammonia Inventory (Vol.)	ter hot gas other *F): ume/Weight): cubic ft: r Nameplate Data	Normal Refrigerant Temperatur Design Air Flow (CFM):	re (*F):
Tube and Fin Material: car Defrost Type: alr wat Design Room Air Temperature (* Design Capacity (TR): Total Internal Vol. (cubic n): Normal Ammonia Inventory (Vol. Air Cooling Evaporator	ter hot gas other *F): ume/Weight): cubic ft: r Nameplate Data	Normal Refrigerant Temperatur Design Air Flow (CFM):	re (*F);
Tube and Fin Material: car Defrost Type: alr wal Design Room Air Temperature (* Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Ammonia Inventory (Vol. Air Cooling Evaporator Manufacturer, Name, Model, Ser	ter hot gas other "F): ume/Weight): cubic ft: r Nameplate Data	Normal Refrigerant Temperatur Design Air Flow (CFM):	re (*F);
Tube and Fin Material: car Defrost Type: alr wat Design Room Air Temperature (* Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Arnmonia Inventory (Voic Air Cooling Evaporator Manufacturer, Name, Model, Ser Year Manufactured:	ter hot gas other "F): ume/Weignt): cubic ft: r Nameplate Data rial No.:	Normal Refrigerant Temperatur Design Air Flow (CFM):	re (*F):-
Tube and Fin Material: car Defrost Type: alr wat Design Room Air Temperature (* Design Capacity (TR): Total Internal Vol. (cubic n): Normal Ammonia Inventory (Voit Air Cooling Evaporator Manufacturer, Name, Model, Ser Year Manufactured: Fan Motor Nameplate	ter hot gas other "F): ume/Weignt): cubic ft: r Nameplate Data rial No.:	Normal Refrigerant Temperatur Design Air Flow (CFM):	re (*F):Power (np):
Tube and Fin Material: car Defrost Type: alr wat Design Room Air Temperature (* Design Capacity (TR): Total Internal Vol. (cubic rt): Normal Ammonia Inventory (Voic Air Cooling Evaporator Manufacturer, Name, Model, Ser Year Manufactured: Fan Motor Nameplate Manufacturer, Name, Model, Ser Frame Stze:	ter hot gas other "F): ume/Weight): cubic ft: r Nameplate Data rial No.: Data rial No., Year Manufactured:	Normal Refrigerant Temperatur Design Air Flow (CFM): Design Pressure (psig): Speed (rpm):	

	Ammonia .			
		AIR-COOLIN	G EVAPORAT	TOR
Location:				ID/Tag No.:
Facility Owner:				
Address:				Phone:
Inspector:				Date:
Application:	Type of Refr	gerant Feed:		
and the same of th	-31	The second secon	Liquid Recircu	ilation (Top Feed)
Storage Freezer.				lation (Bottom Feed)
Storage Cooler			Flooded (Surg	e Drum)
Dock			Direct Expansi	ion (DX)
Process Room			Ammonia Abs	orption System
Other (Describe)			Other (Describ)e)
Other (Describe) uipment Data and Lin		Model:	Other (Describ	Serial Number:
uipment Data and Lii			-	Serial Number:
uipment Data and Lin			Design Pressur	Serial Number:e (psig):
uipment Data and Lii anufacturer: ear Manufactured:	mits:	Model:	Design Pressur	Serial Number:
uipment Data and Lis anufacturer: ear Manufactured: nom Air Temp (°F):	mits:	Model:	Design Pressum Suction (p mal Ammonia Inventor	Serial Number:
uipment Data and Lin anufacturer: ear Manufactured: nom Air Temp (°F): ntal Internal Vol:	mits:	Model:	Design Pressum Suction (p mal Ammonia Inventor	Serial Number:
quipment Data and Lin anufacturer: ear Manufactured: nom Air Temp (°F): ntal Internal Vol: ube and Fin Material:	mits:	Model:	Design Pressum Suction (p mal Ammonia Inventor el, ∐ Aluminum,	Serial Number: e (psig): sig (°F): y (lbs.): Stainless tube/Aluminum Fin
uipment Data and Lin anufacturer: ear Manufactured: bom Air Temp (°F): btal Internal Vol: the and Fin Material: efrost Type:	mits:	Model:	Design Pressum Suction (p. nal Ammonia Inventor el, ☐ Aluminum, ☐ Hot Gas, ☐	Serial Number: (psig): sig /°F): y (lbs.): Stainless tube/Aluminum Fin
quipment Data and Lin anufacturer: ear Manufactured: soom Air Temp (°F): stal Internal Vol: abe and Fin Material:	mits: C Galv. Steel, Air,	Model: "u. Ft. Norn All Stainless Stee Water,	Design Pressum Suction (p nal Ammonia Inventor el,	Serial Number: e (psig): sig /°F): y (lb2.): Stainless tube/Aluminum Fin Other: FLA:

IIAR Standard 6



ID Number:

		AIR-C	OOLING EVAPORATORS
Plant Owner:			
Address:			
Contact:		Telephone:	
Inspector;		Date:	
Air Cooling Evaporators			
Air Cooling Evaporator Location:			
Air Cooling Identification Mark/No.:			
Application		Type of Refrigerant F	eed
Blast Freezer	Storage Freezer	☐ Liquid Recirculation	☐ Ory Expansion (DX)
Process Room	□ Dock	☐ Flooded (Surge Drum)	
Storage Cooler		Other (Describe):	
Other (Describe)			
Application Data Tube and Fin Material: Carbon's	steel 🗆 stainless steel 🗆	aluminum	
		aluminum	
Tube and Fin Material:	□ hot gas □ other		e (*F):
Tube and Fin Material:	□ hot gas □ other	Normai Refrigerant Temperatur	e (*F):
Tube and Fin Material: carbon's Defrost Type: air water Design Room Air Temperature (*F): Design Capacity (TR):	not gas other	Normal Refrigerant Temperatur Design Air Flow (CFM):	e (°F):
Tube and Fin Material: carbon's Defrost Type: air water Design Room Air Temperature (*F): Design Capacity (TR): Total Internal Vol. (cubic ft):	□ hot gas □ other	Normal Refrigerant Temperatur Design Air Flow (CFM):	e (*F):
Tube and Fin Material: carbon s Defrost Type: air water Design Room Air Temperature (*F): Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Ammonia Inventory (Volume/V	□ hot gas □ other Meight): □ cubic ft:	Normal Refrigerant Temperatur Design Air Flow (CFM):	e (*F):
Tube and Fin Material: carbon s Defrost Type: air water Design Room Air Temperature (*F): Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Ammonia Inventory (Volume/V	hot gas other	Normal Refrigerant Temperatur Design Air Flow (CFM):	e (*F):
Tube and Fin Material: carbon s Defrost Type: air water Design Room Air Temperature (*F): Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Ammonia Inventory (Volume/V	hot gas other	Normal Refrigerant Temperatur Design Air Flow (CFM):	e (*F):
Tube and Fin Material: carbon's Defrost Type: air water Design Room Air Temperature (*F): Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Ammonia Inventory (Volume/V	Meight): cubic ft:	Normal Refrigerant Temperatur Design Air Flow (CFM):	e (*F):
Tube and Fin Material: carbon s Defrost Type: air water Design Room Air Temperature (*F): Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Ammonia Inventory (Volume/V Air Cooling Evaporator Na Manufacturer, Name, Model, Serial No Year Manufactured: Fan Motor Nameplate Data	Meight):cubic ft:	Normal Refrigerant Temperatur Design Air Flow (CFM):	e (*F):
Tube and Fin Material: carbon so Defrost Type: air water water Design Room Air Temperature (*F): Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Ammonia Inventory (Volume/VAir Cooling Evaporator Nair Manufactures, Name, Model, Serial No Year Manufactured: Fan Motor Nameplate Data	Meight):cubic ft:	Normal Refrigerant Temperatur Design Air Flow (CFM):	e (*F):
Tube and Fin Material: carbon so Defrost Type: air water water Design Room Air Temperature (*F): Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Ammonia Inventory (Volume/VAir Cooling Evaporator Na Manufactures, Name, Model, Serial No Year Manufactured: Fan Motor Nameplate Dat. Manufacturer, Name, Model, Serial No Frame Size:	Meight): cubic ft: cumeplate Data b. Year Manufactured:	Normal Refrigerant Temperatur Design Air Flow (CFM): Ib: Design Pressure (psig):	

	Ammonia	Refrigeration	curry mapped	
		AIR-COOLING	G EVAPORAT	OR
Location:				ID/Tag No.:
Facility Owner:				
Address:				Phone:
Inspector:				Phone: Date:
-	Type of Refr	rigerant Feed:		
	-31	0	Liquid Recirc	ulation (Top Feed)
Storage Freezer	r	. 🗇		ulation (Bottom Feed)
Storage Cooler		. 🗇	Flooded (Surg	e Drum)
Dock		. 🖂	Direct Expans	ion (DX)
Process Room.		. 🗆	Ammonia Abs	orption System
01 0	,	Total Control of the		
		·U	Other (Descrit	pe)
Other (Describe	2-0	Model:	Other (Descrit	Serial Number:
quipment Data and L	2-0	1		
quipment Data and L (anufactwer:	2-0	1	Design Pressur	Serial Number:e (psig):
quipment Data and L (anufactwer: ear Manufactured:	imits:	Model:	Design Pressur	Serial Number: e (psig): sig (°F):
quipment Data and L lanufacturer: ear Manufactured: oom Air Temp (°F):	imits:	Model:	Design Pressur Suction (p al Ammonia Inventor	Serial Number:
quipment Data and L Ianufacturer: ear Manufactured: oom Air Temp (*F): otal Internal Vol:	imits:	Model:	Design Pressur Suction (p al Ammonia Inventor	Serial Number:
quipment Data and L Ianufacturer: ear Manufactured: oom Air Temp (°F): otal Internal Vol: ube and Fin Material:	imits:	Model:	Design Pressur Suction (p al Ammonia Inventor	Serial Number: e (psig): sig (°F): ry (lbs.): Stainless tube/Aluminum Fin
quipment Data and L lanufacturer: ear Manufactured: oom Air Temp (°F): otal Internal Vol: ube and Fin Material: efrost Type:	imits:	Model:	Design Pressur Suction (p al Ammonia Inventor ,	Serial Number: e (psig): sig /°F): ry (lbs.): Stainless tube/Aluminum Fin
quipment Data and L lanufacturer: ear Manufactured: oom Air Temp (°F): otal Internal Vol: ube and Fin Material: efrost Type: un Motor Data:	imits:	Model: Cu. Ft. Norm: All Stainless Steel	Design Pressur Suction (p al Ammonia Inventor ,	Serial Number: e (psig): sig (°F): y (lbs.): Stainless tube/Aluminum Fin Other: FLA:

IIAR Standard 6



ID Number:

			OOLING EVAPORATORS
Plant Owner:			
Address:			
Contact:		Telephone:	
Inspector;		Date:	
Air Cooling Evaporato	rs		
Air Cooling Evaporator Location	Q		
Air Cooling Identification Mark/N	No.:		
Application		Type of Refrigerant F	Feed
☐ Blast Freezer	Storage Freezer	Liquid Recirculation	☐ Ory Expansion (DX)
Process Room	□ Dock	☐ Flooded (Surge Drum)	
Storage Cooler		Other (Describe):	
Other (Describe):			
Application Data	rbon steel 🔲 stainless steel 🏾	aluminum	
Tube and Fin Material: car	terhot gasother	Normai Refrigerant Temperatu	ure (*F):
Tube and Fin Material:	ter hot gas other	Normai Refrigerant Temperatu	ire (*F);
Tube and Fin Material: call Defrost Type: all was Design Room Air Temperature (Design Capacity (TR):	ter not gas other	Normal Refrigerant Temperatu	ure (*F):
Tube and Fin Material: cal Defrost Type: air wa Design Room Air Temperature (Design Capacity (TR): Total Internal Vol. (cubic ft):	ter not gas other	Normal Refrigerant Temperatu Design Air Flow (CFM):	rre (*F):
Tube and Fin Material: cal Defrost Type: alr wa Design Room Air Temperature (Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Arimonia Inventory (Voa	ter	Normal Refrigerant Temperatu Design Air Flow (CFM):	ire (*F):
Tube and Fin Material: call Defrost Type: all was Design Room Air Temperature (Design Capacity (TR): Total Internal Vol. (cubic n): Normal Ammonia Inventory (Voi	ter	Normal Refrigerant Temperatu Design Air Flow (CFM):	re (*F):
Tube and Fin Material: cal Defrost Type: alr wa Design Room Air Temperature (Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Arnmonia Inventory (Voi	ter	Normal Refrigerant Temperatu Design Air Flow (CFM):	ire (*F):
Tube and Fin Material: cal Defrost Type: alr wa Design Room Air Temperature (Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Ammonia Inventory (Vol. Air Cooling Evaporato Manufacturer, Name, Model, Ser	ter	Normal Refrigerant Temperatu Design Air Flow (CFM):	ire (*F):
Tube and Fin Material: cal Defrost Type: alr wa Design Room Air Temperature (Design Capacity (TR): Total Internal Vol. (cubic n): Normal Ammonia Inventory (Voi Air Cooling Evaporato Manufacturer, Name, Model, Ser Year Manufactured: Fan Motor Nameplate	ter	Normal Refrigerant Temperatu Design Air Flow (CFM):	re (*F):
Tube and Fin Material: cal Defrost Type: alr wa Design Room Air Temperature (Design Capacity (TR): Total Internal Vol. (cubic ft): Normal Ammonia Inventory (Vol. Air Cooling Evaporato Manufacturer, Name, Model, Ser	ter	Normal Refrigerant Temperatu Design Air Flow (CFM):	rre (*F):
Tube and Fin Material:	ter	Normal Refrigerant Temperatu Design Air Flow (CFM): Design Pressure (psig): Speed (rpm):	

	Ammonia			,	resour .		
		AIR-COO	LING EVA	APORAT	OR		
Location:					ID/Tag	No.:	
Facility Owner:							
Address:					Phone:		
Inspector:					Date:	-	
Application:	Type of Ref	rigerant Feed					
Blast Freezer		. 🖸	Li	iquid Recirc	ulation (7	Top Feed)	
Storage Freeze	r	. 🗆	Li	iquid Recirc	ulation (I	Bottom Feed)	
Storage Cooler		. 🗀	FI	looded (Surg	e Drum)		
Dock		. 🗆	D	irect Expans	ion (DX))	
Process Room			A	mmonia Ab	orption !	System	
Other (Describ	e)	-1	_	ther (Descri	oe)		
nipment Data and I	2-0	-	-	ther (Descri			
nipment Data and I	2-0	Mode	1:		Seni	al Number:	
nipment Data and I mufactwer: ar Manufactured:	2-0	-	1:	sign Préssu	Seri e (psig):	al Number:	
nipment Data and I mufacturer: ar Manufactured: om Air Temp (°F):	imits:	Mode	l:De	sign Pressur Suction (p	Seri e (psig): sig /°F):	al Number:/	
nipment Data and I mufactwer: ar Manufactured: om Air Temp (°F): tal Internal Vol:	limits:	Mode Cu. Ft.	l:De	sign Pressur Suction (p onia Invento	Serie (psig): sig /°F): ry (lbs.):	al Number:/	
nipment Data and I mufactwer: ar Manufactured: om Air Temp (°F): tal Internal Vol: be and Fin Maternal:	Limits:	Mode Cu. Ft.	De Normal Ammo	sign Pressur Suction (p onia Invento Aluminum,	Serie (psig): sig /°F): ry (lbs.):	al Number:/	
nipment Data and I mufactwer: ar Manufactured: om Air Temp (°F): tal Internal Vol:	limits:	Mode Cu. Ft.	l:De	sign Pressur Suction (p onia Invento Aluminum,	Serie (psig): sig /°F): ry (lbs.):	al Number:/	
nipment Data and I mufactwer: ar Manufactured: om Air Temp (°F): tal Internal Vol: be and Fin Maternal:	Limits:	Mode Cu. Ft.	De Normal Ammo	sign Pressur Suction (p onia Invento Aluminum,	Serie (psig): sig /°F): ry (lbs.):	al Number:/	
nipment Data and I mufacturer: ar Manufactured: om Air Temp (°F): tal Internal Vol: be and Fin Material: frost Type:	Limits:	Mode Cu. Ft.	De Normal Ammo	sign Pressur Suction (p onia Invento Aluminum,	Seri; e (psig): sig /°F): ry (lbs.):	al Number:/	
nipment Data and I mufacturer: ar Manufactured: om Air Temp (°F): tal Internal Vol: be and Fin Material: frost Type:	Limits:	Cu. Ft. All Stainle Water,	l:De Normal Ammo ess Steel,Hot G.	sign Pressur Suction (p onia Inventor Aluminum, as,	Serii e (psig): sig /°F): ry (lbs.): U	al Number:/ / Stainless tube/Alumin	num Fin

IIAR Standard 6

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ID Number:

		AIR-C	OOLING EVAPORATORS
Plant Owner:			
Address:			
Contact:		Telephone:	
Inspector;		Date:	
Air Cooling Evapor	ators		
Air Cooling Evaporator Loca	ation:		
Air Cooling Identification Ma	erk/No.:		
Application		Type of Refrigerant F	eed
Blast Freezer	Storage Freezer	Liquid Recirculation	☐ Dry Expansion (DX)
Process Room	□ Dock	☐ Flooded (Surge Drum)	
Storage Cooler		Other (Describe):	
Other (Describe):			
Defrost Type: air	carbon steel stainless steel		
	ure (°F):		re (°F):
-5-	Ar. (341) (341) (341)		
Normal Ammonia Inventory	(Volume/Weight): cubic ft:	(D:	
Air Cooling Evapor	ator Nameplate Data		
	State of the state		
Manufacturer, Name, Model	State of the state	Design Pressure (psig):	
Manufacturer, Name, Model Year Manufactured:	I, Seriai No.:	Design Pressure (psig):	
Manufacturer, Name, Model Year Manufactured: Fan Motor Namepla	I, Seriai No.:	Design Pressure (psig):	
Manufacturer, Name, Model Year Manufactured: Fan Motor Namepla	I, Serial No.: ate Data	Design Pressure (psig): Speed (rpm):	Pawet (hp):
Manufacturer, Name, Model Year Manufactured: Fan Motor Namepla Manufacturer, Name, Model Frame Stze:	i, Seriai No.;	Speed (rpm):	Power (hp):Phase: □1 □3

			ion outre, in	pection	CHOCK	
		AIR-COOI	ING EVAPO	RATOR		
Location:				ID/T;	ag No.:	
Facility Owner:						
Address:				Phon	•	
Inspector:				Date:		
Application:	Type of Refr	igerant Feed:				
Blast Freezer			Liquid R	ecirculation	(Top Feed)	
Storage Freeze	r		Liquid R	ecirculation	(Bottom Fee	ed) 🔲
Storage Cooler			Flooded	(Surge Drun	n)	
Dock			Direct E	cpansion (D	X)	
Process Room			Ammoni	a Absorption	n System	
Other (Describ	e)	-7	Other (D	escribe)		
	20	Model:	-		erial Number	
quipment Data and L	20	- T	Design Pr	Se essure (psig	erial Number:	
uipment Data and L anufactwer:	20	- T	Design Pr	Se essure (psig	erial Number:	
uipment Data and L anufactwer: ear Manufactured:	imits:	Model:	Design Pr	Se essure (psig on (psig /°F	erial Number ():	
uipment Data and L anufacturer: ear Manufactured: oom Air Temp (°F):	imits:	Model:	Design Pr Suct Normal Ammonia Inv	Se essure (psig on (psig °F rentory (lbs.	erial Number: (): ():	
uipment Data and L ianufacturer: ear Manufactured: oom Air Temp (°F): otal Internal Vol:	imits:	Model:	Design Pr Suct Normal Ammonia Inv	Se essure (psig on (psig °F rentory (lbs.	erial Number: (): (): (): (): (): (): (): (): () Stainless tu	· · · · · · · · · · · · · · · · · · ·
uipment Data and I ianufacturer: ear Manufactured: oom Air Temp (°F): otal Internal Vol: ube and Fin Maternal:	imits:	Model:	Design Pr Suct Normal Ammonia Inv 5 Steel, ☐ Alumi	Se essure (psig on (psig °F ventory (lbs. num,	erial Number: (): (): (): (): (): (): (): (): () Stainless tu	· · · · · · · · · · · · · · · · · · ·
quipment Data and L ianufacturer: ear Manufactured: oom Air Temp (°F): otal Internal Vol: ube and Fin Material: efrost Type:	imits:	Model:	Design Pr Suct Normal Ammonia In 5 Steel, Alumi Hot Gas,	Se essure (psig on (psig °F ventory (lbs. num,	erial Number:):):):] Stainless tu	· · · · · · · · · · · · · · · · · · ·
quipment Data and I ianufacturer: ear Manufactured: oom Air Temp (°F): otal Internal Vol: ube and Fin Material: efrost Type: n Motor Data:	imits:	Model: Cu. Ft. All Stainles: Water,	Design Pr Suct Normal Ammonia In 5 Steel, Alumi Hot Gas,	Seressure (psig on (psig /°F ventory (lbs. num, [erial Number:):):):] Stainless tu	:

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Requirement/Recommendation	Conforms	Recommended Action/Comments	Safety Status	Target Date
a) Nameplate legible & complete?	☐ Yes ☐ No			
b) Suitable for ammonia?	☐ Yes ☐ No	T. E.		
c) Operation within limits?	☐ Yes ☐ No			
d) Adequately anchored and supported?	☐ Yes ☐ No			
e) Safe access for service & maintenance?	☐ Yes ☐ No			
f) Free from excessive vibration?	☐ Yes ☐ No	0.0		
g) Adequate protection against traffic hazards?	☐ Yes ☐ No			
h) Evaporator free from excessive ice buildup and clean of dirt?	☐ Yes ☐ No			
) Drive properly guarded & protected?	□ Yes □ No			
) Evaporator condition (check one) 🔲 clean, no visit	ble corrosion - 🗌 silght	visible corrosion	corrosion	
Are there any other conditions that might negatively a if yes, describe.	ffect safe evaporator op	eration?		

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	R-COOLING EV	UKS	THE STATE OF THE S	
Location:	T		ID/Tag No.:	1.5
Inspection Items	Conforms	Safety Status	Recommended Action, or Comments	Targe Date
 Equipment labeled and nameplate legible per ANSI/IIAR 2? 	Yes No No N/A			
b) Suitable for ammonia?	Yes No No N/A			
c) Operating within limits?	Yes No No N/A			
d) Fasteners tight, adequately anchored, and supported?	Yes No No N/A			
e) Safe access for Inspection, Testing and Maintenance (ITM)?	Yes No No N/A			
f) Free of excessive ice buildup?	Yes No No N/A			1
g) Free of abnormal sounds/vibration?	Yes No No N/A			
h) Free of ammonia leaks?	Yes No No N/A	2.01		
All piping has markers per ANSI/IIAR 2?	Yes No No N/A	2.1		
) Are valves in good condition?	Yes No No N/A			
k) Are critical manual and control valves tagged, exercised, and stems lubricated?	Yes No No N/A			
 Sufficient pressure/temperature gauges and/or transducers are present and functioning adequately? 	Yes No No N/A			
m) Belts, sheaves, coupling, etc., in good working order and adequately guarded?	Yes No No N/A			
n) Free of pitting and surface damage and coils free of dirt? a. If No. note damage level:	Yes No No N/A Slight Extensive			
o) Free of any other conditions that negatively affect safe operation?	Yes 🗌 No 🗎 N/A 🗍			
negatively affect safe operation? If No, describe:				
ş				
				- 30
3-		_		
No.				

Ammonia Refrigeration Safety Inspection Checklist

IIAR Standard 6

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) Nameplate legible & complete?		Action/Comments	Status	Date
/ Harrispinis registre is astripinis.	☐ Yes ☐ No			
) Suitable for ammonia?	☐ Yes ☐ No		. 1	
c) Operation within limits?	☐ Yes ☐ No		11	
i) Adequately anchored and supported?	☐ Yes ☐ No			
) Safe access for service & maintenance?	☐ Yes ☐ No		11 22 -	
Free from excessive vibration?	☐ Yes ☐ No			
Adequate protection against traffic hazards?	☐ Yes ☐ No			
Evaporator free from excessive ice buildup and clean of dirt?	☐ Yes ☐ No			
Drive properly guarded & protected?	□ Yes □ No			
Evaporator condition (check one) Clean, no visible	corrosion 🗆 slight	visible corrosion axtensive co	rrosion	
Are there any other conditions that might negatively affect if yes, describe.	t safe evaporator opo	eration? Yes No		

IIAR Bulletin No. 109

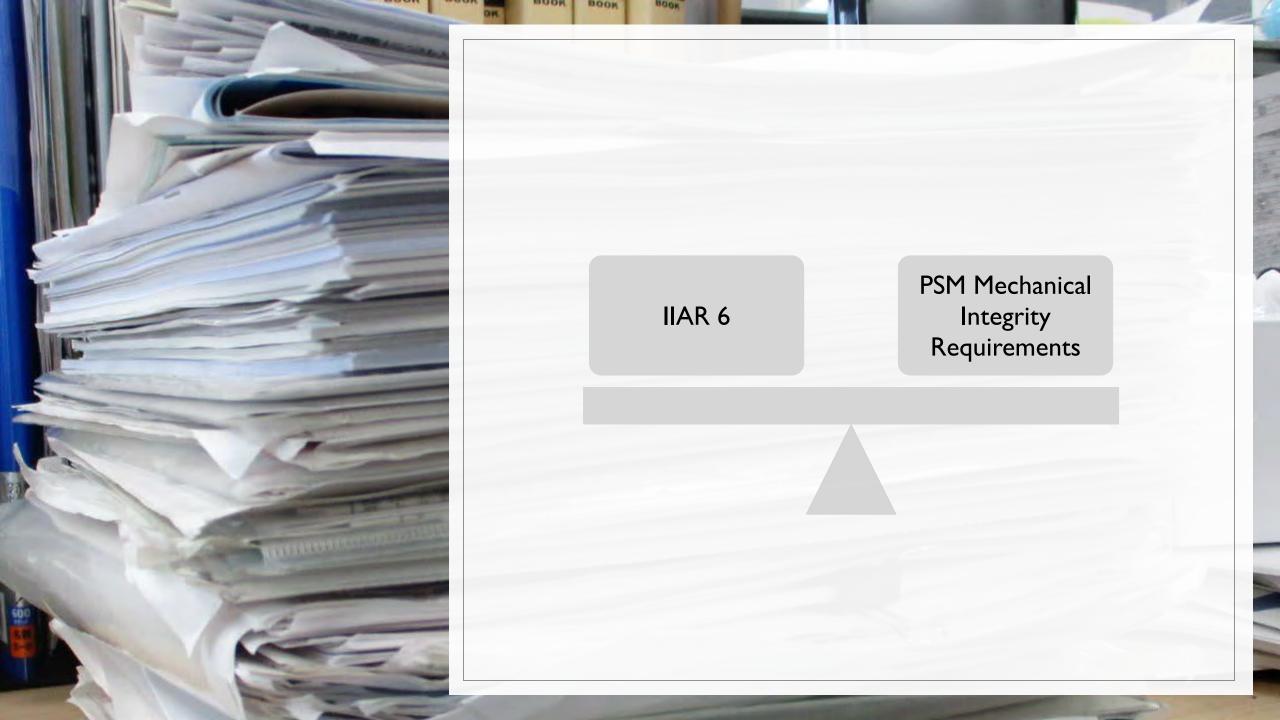
Location:	R-COOLING EV	Page 1	ID/Tag No.:	
Inspection Items	Conforms	Safety Status	Recommended Action, or Comments	Targe
) Equipment labeled and nameplate legible per ANSI/IIAR 2?	Yes No No N/A			
) Suitable for ammonia?	Yes No No N/A			
) Operating within limits?	Yes No No N/A			
l) Fasteners tight, adequately anchored, and supported?	Yes No No N/A			
 Safe access for Inspection, Testing and Maintenance (ITM)? 	Yes No No N/A			
Free of excessive ice buildup?	Yes 🗌 No 🗌 N/A 🗍			1 1
Free of abnormal sounds/vibration?	Yes No No N/A	i e i		
i) Free of ammonia leaks?	Yes No No N/A			
All piping has markers per ANSI/IIAR 2?	Yes No No N/A			
Are valves in good condition?	Yes No No N/A			
Are critical manual and control valves tagged, exercised, and stems lubricated?	Yes No No N/A			
) Sufficient pressure/temperature gauges and/or transducers are present and functioning adequately?	Yes No No N/A			
n) Belts, sheaves, coupling, etc., in good working order and adequately guarded?	Yes No No N/A			
Free of pitting and surface damage and coils free of dirt? If No. note damage level:	Yes No No N/A Slight Extensive			Į Į
Free of any other conditions that negatively affect safe operation?	Yes 🗌 No 🗎 N/A 🗌	==1	-	
f No, describe:				
<u></u>				
-				-5-
-				

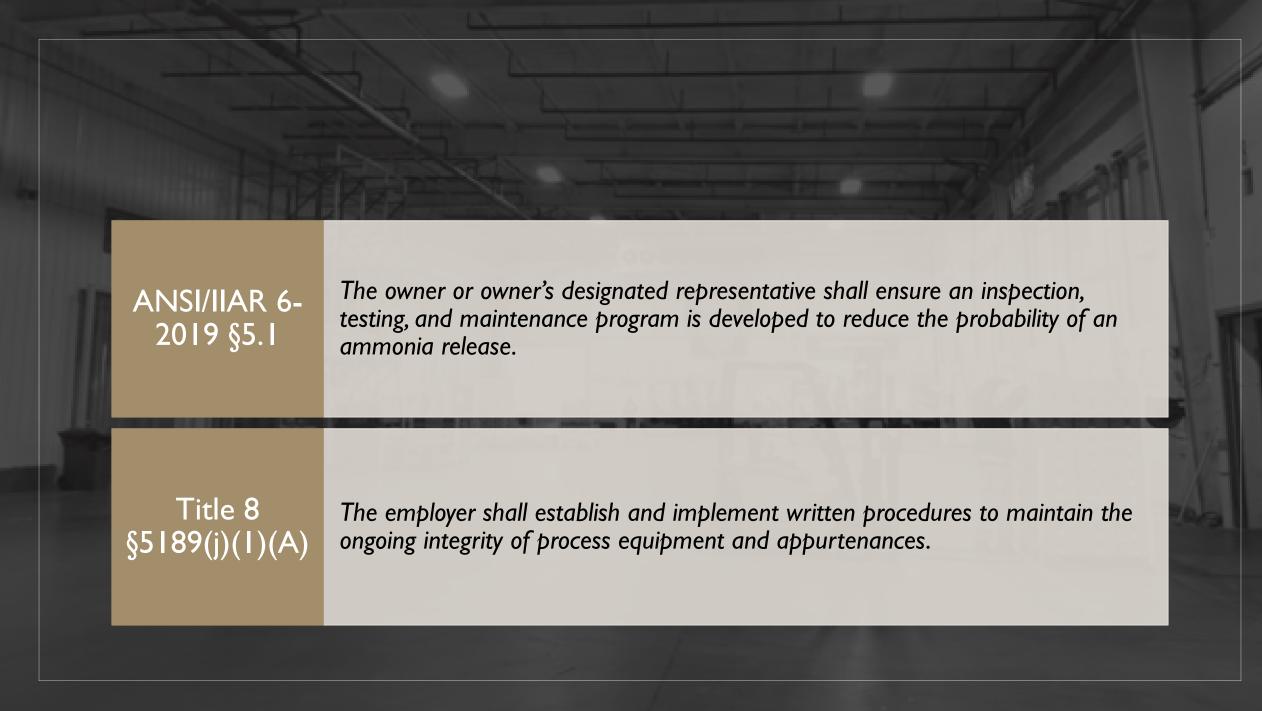
IIAR Standard 6

HAR BULLETIN 109 - 10/97

P. C. All D. L. D. J.

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





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)	



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
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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
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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
- \circ 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
- \circ A Annual
- B Biennial,
- 3 Three Years
- ∘ 5 Five Years

- 10 Ten Years
- WA Where Applicable
- NA Not Applicable
- NR Not Required

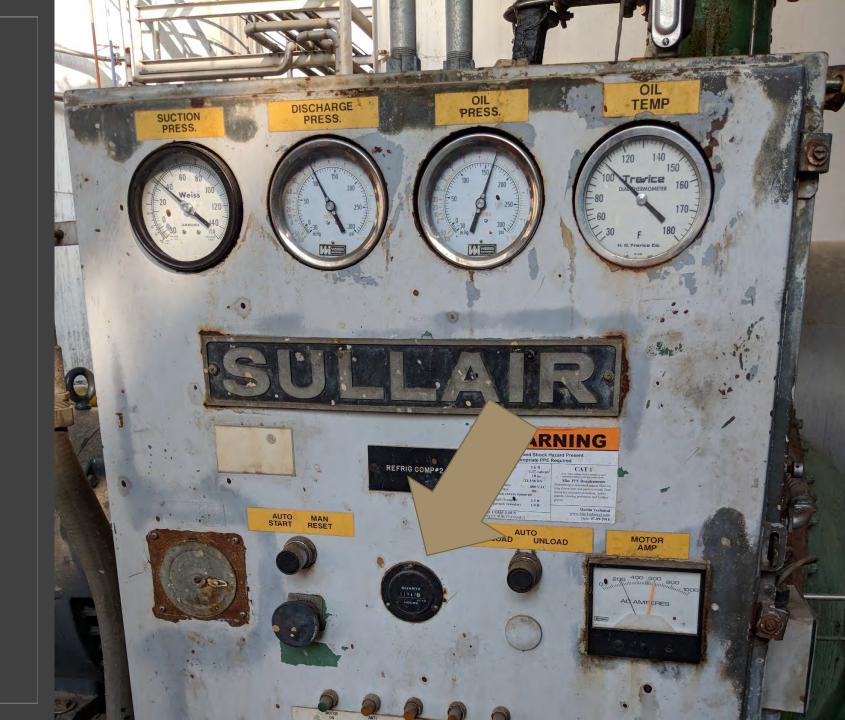
ITM Task Description		Freque	ncy	ITM Task	Frequency				
Inspection	Screw	Recip	Rotary Vane	Inspection	Screw	Recip	Rotary Vane		
a) Runtime hours	WA-D	WA-D	WA-D	q) Drive guard in place	D	D	D		
b) Suction pressure	D	D	D	r) Foundation solid, in place, and free from evidence of deterioration	Α	Α	Α		
c) Discharge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

ITM Task Description		Freque	ncy	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	Α	Α	Α		
c) Discharge pressure	D	D	D	s) Visually inspect mounting bolts are in	Α	Α	A		
d) Oil pressure	D	D	D	place					
e) Oil temperature	D	WA-D	D	t) Visually inspect metal surfaces for pitting or surface damage	Α	Α	Α		
f) Discharge temperature	D	WA-D	D	u) Visually inspect coupling for wear	Α	WA-A	WA-A		
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h) Oil filter differential pressure	D	WA-D	NA	and associated timers and relays	•	A	A		
i) Oil leaks	D	D	D	w) Operation of oil heaters	A	A	A		
j) Lubricator oil level and drip rate	NA	NA	D	x) Operation of unloader	М	М	M		
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n) Motor amperage (current)	D	WA-D	WA-D	a) Low suction pressure cutout	Α	Α	Α		
o) Recorded Alarms and Shutdowns	D	WA-D	WA-D	b) High discharge pressure cutout (HPCO)	Α	Α	Α		
p) Free from abnormal sounds and excessive vibration	D	D	D -	See Section 6.1.1					

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

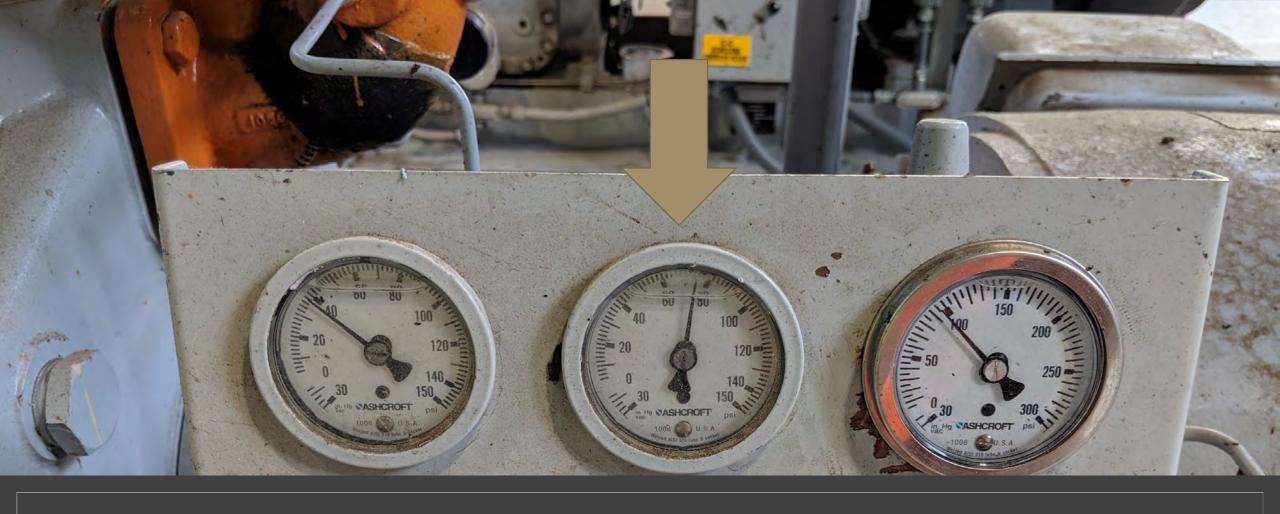
ITM Task Description		Freque	ncy	ITM Task	Frequency				
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p) Free from abnormal sounds and excessive vibration	D	D	D	See Section 6.1.1					

Record compressor runtime (hours)



Record compressor suction pressure

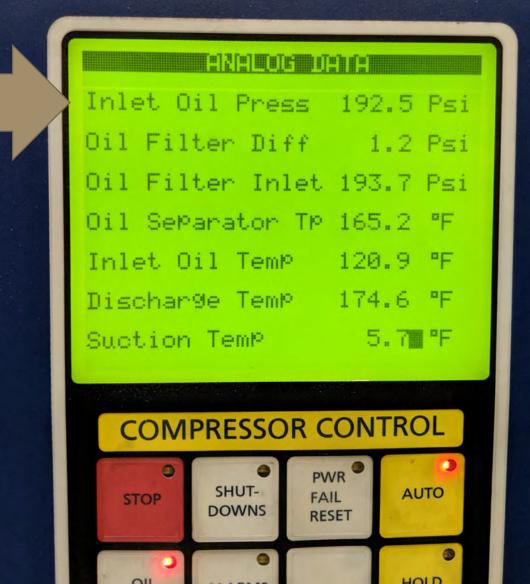




Record compressor discharge pressure

Record compressor oil pressure

Micro III

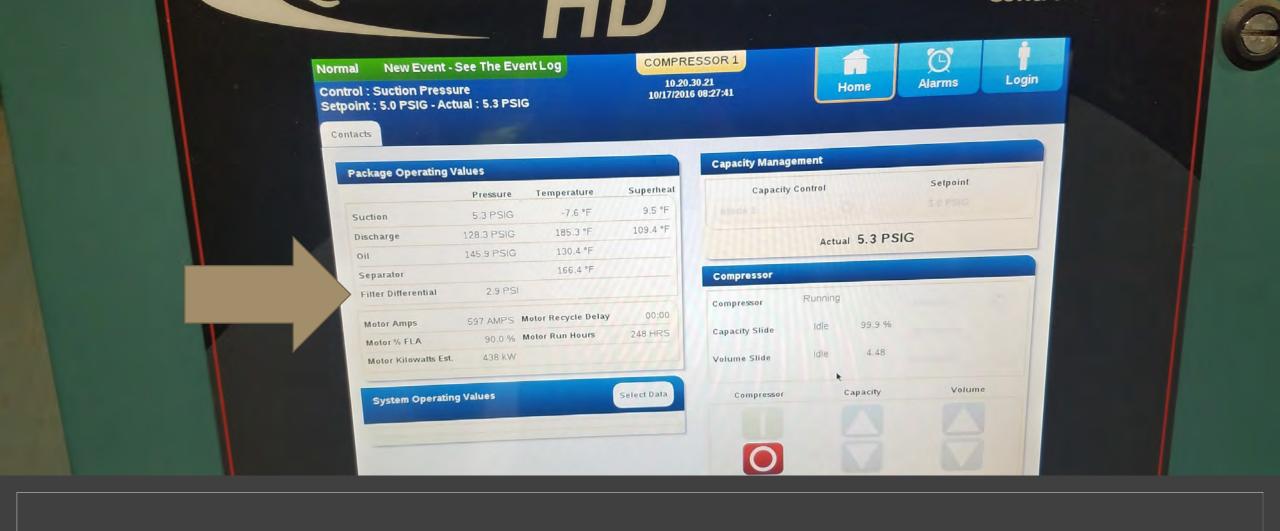


Record compressor oil temperature



Record compressor discharge temperature





Record compressor oil filter differential pressure

Record compressor motor amperage



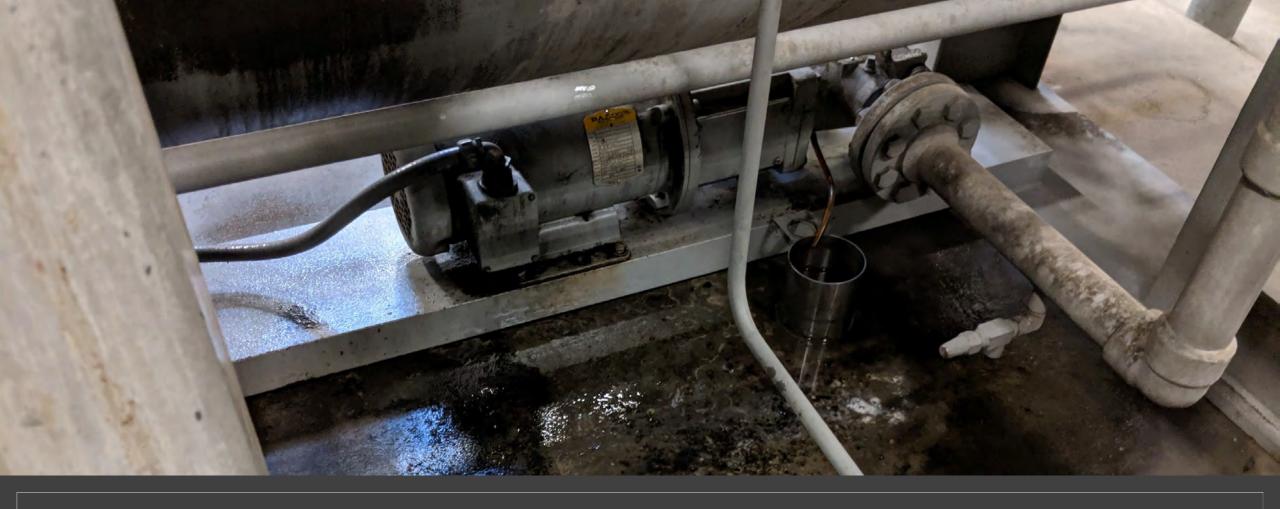
Record compressor alarms and shutdowns

Micro III

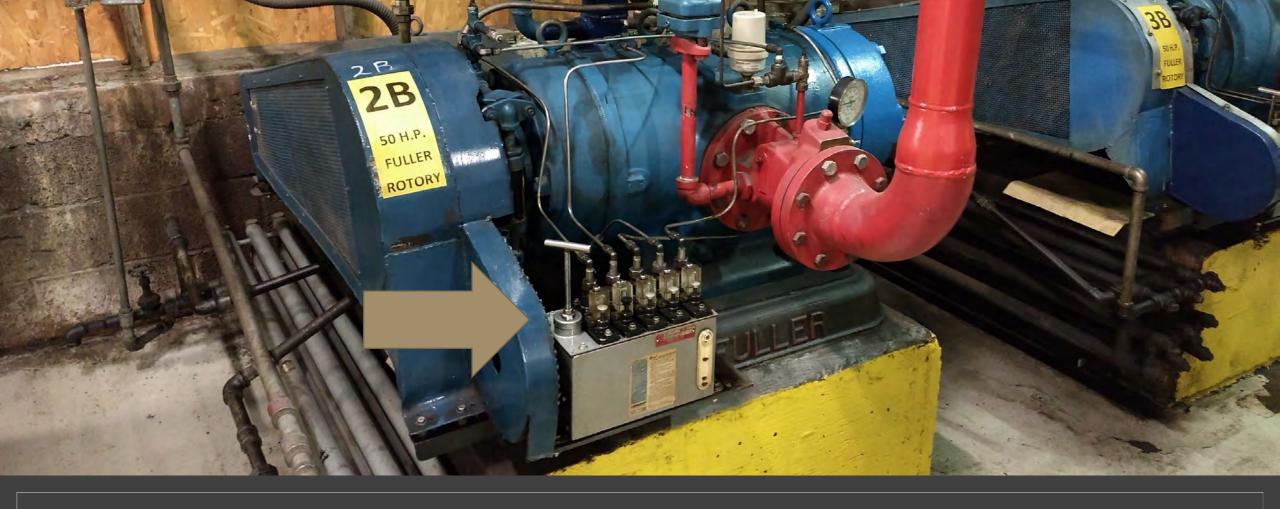


Verify oil levels are adequate





Check for oil leaks



Check lubricator oil level and drip rate

Check compressor for unusual vibration



WEEKLY INSPECTIONS

Check shaft seal drip rate

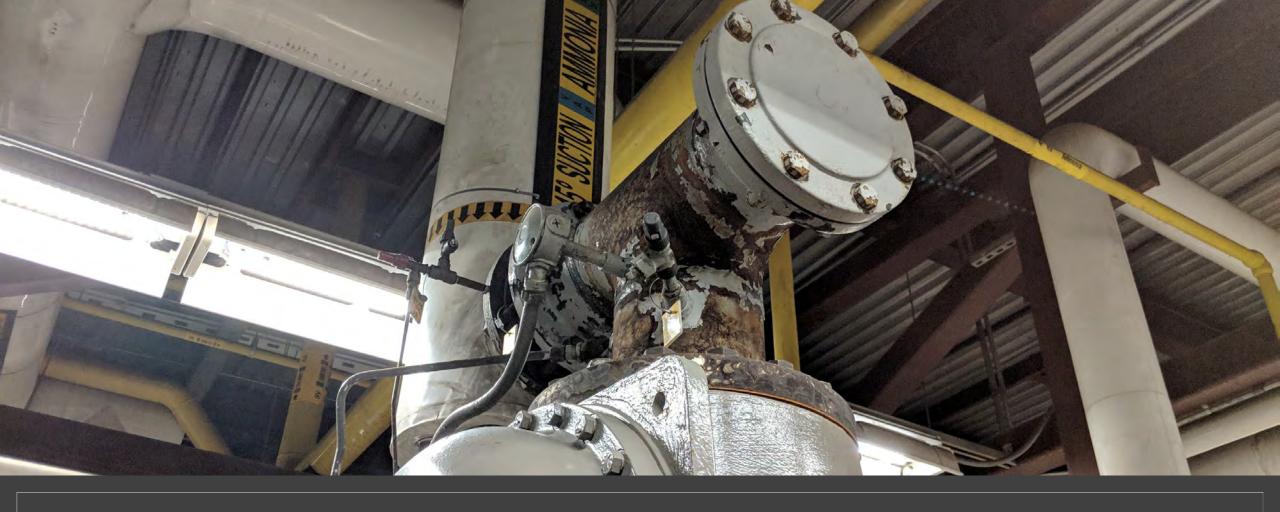


Check that foundation is solid



Check mounting bolts for tightness





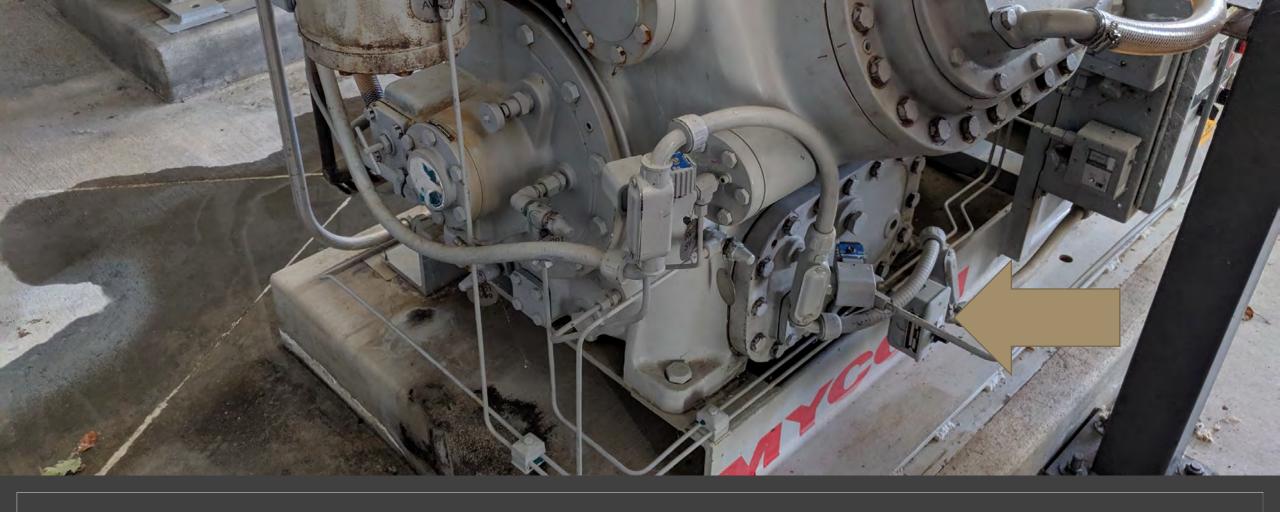
Visually inspect metal surfaces for pitting or surface damage

Visually inspect coupling for wear



Visually inspect starter connections and associated timers and relays





Inspect operation of oil heaters

MONTHLY INSPECTIONS

Inspect operation of unloader



Inspect alignment of motor drive shaft



Test low suction pressure cutout



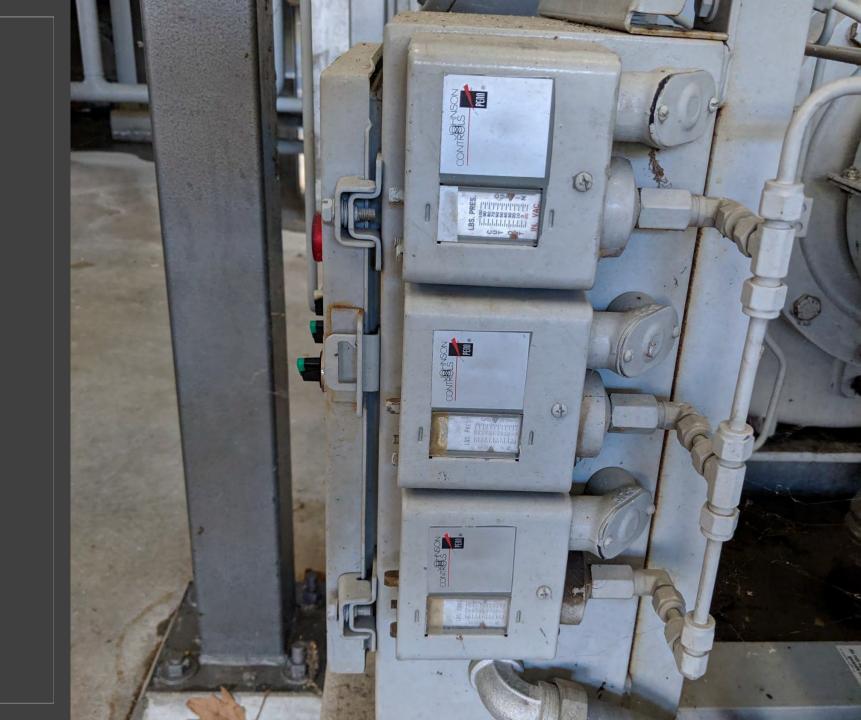


Test high discharge pressure cutout



Test high discharge temperature cutout

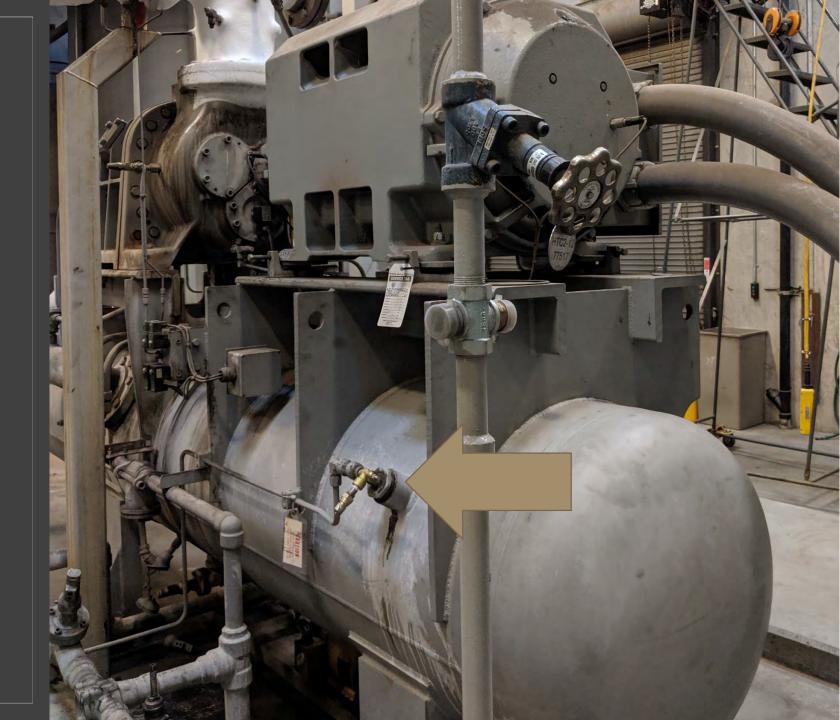
Test low oil pressure cutout



Test high liquid level cutout



Add oil (as needed)



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



Clean external oil pump (5-Years)



Oil Analysis (annual)



Lubricant Analysis Report

North America: +1-877-808-3750



Overall report severity based on comments.

Additional Testing

Account Information	Component Information	Sample Information
Account Number: 401110-8241-0645 Company Name: FOSTER FARMS (PORTERVILLE, CA) Contact: Address:	Component ID: SB-4 Secondary ID: Component Type: AMMONIA SCREW COMPRESSOR Manufacturer: FES Model: Information Requested Application: PLANT/INDUSTRIAL Sump Capacity:	Tracking Number: 18178Y06677 Lab Number: I-115134 Lab Location: Indianapolis Data Analyst: JAS Sampled: 02-Oct-2018 Received: 09-Oct-2018 Completed: 10-Oct-2018
Filter Information	Miscellaneous Information	Product Information
Filter Type: Information Requested Micron Rating: 0	Miscellaneous: NONE	Product Manufacturer: Information Requested Product Name: Information Requested Viscosity Grade: Information Requested

	Wear Metals (ppm)							Contaminant Metals (ppm)			Multi-Source Metals (ppm)				Additive Metals (ppm)									
Sample #	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Вогоп	Magnesium	Calcium	Barium	Phosphorus	Zinc
1	3	0	0	0	0	0	2	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	1	1

		Sample	Infor	mation					Fluid Properties							
Sample #	Date Sampled	Date Received	T Lube Time	r Unit Time	Lube Change	Lube Added	Filter Change	Fuel Dilution	Soot Soot	water	P VISCOSITY	y Viscosity 100°C	Acid Acid Number	Base No.	oxidation Oxidation	o/squ Nitration
1	02-Oct-2018	09-Oct-2018	0	11151	No	0	No			0 - mo. 6304C	64.9		0.01	1		

	Particle Count (particles/mL)														
E #	ISO Code	1													
Sampl	Based On 4/6/14	> 4 µm	> 6 µm	> 10 µm	> 14 µm	> 21 µm	> 38 µm	> 70 µm	> 100 µm	Test Method					

Align external oil pump shaft (5-years)





Change oil (oil analysis, runtime, or annual)

Verify coupling bolts are tight (annual)



Replace shaft seal (as needed)



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

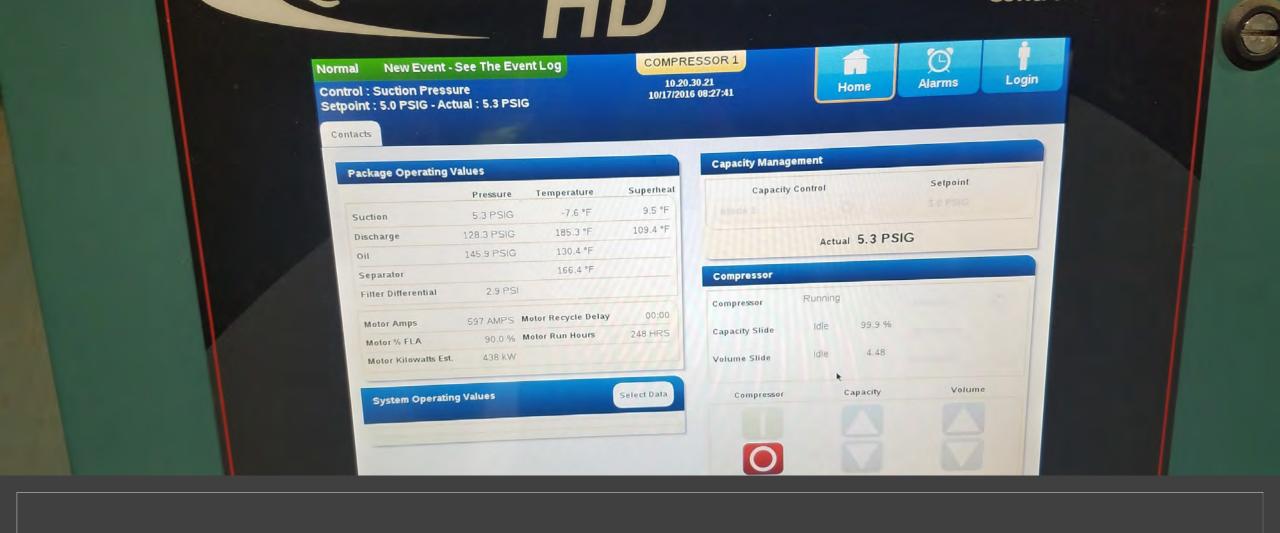




Lubricate compressor and external oil pump electric motor bearings (semi-annual)

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





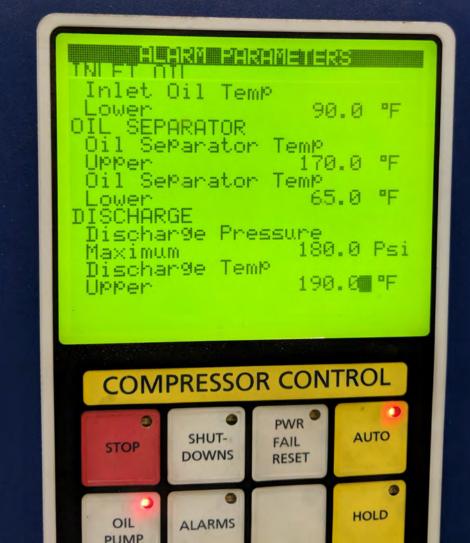
Verify integrity of control power (annual)



Verify integrity of starter connections (annual)

Calibrate pressure and temperature cutout switches (annual)

Micro III







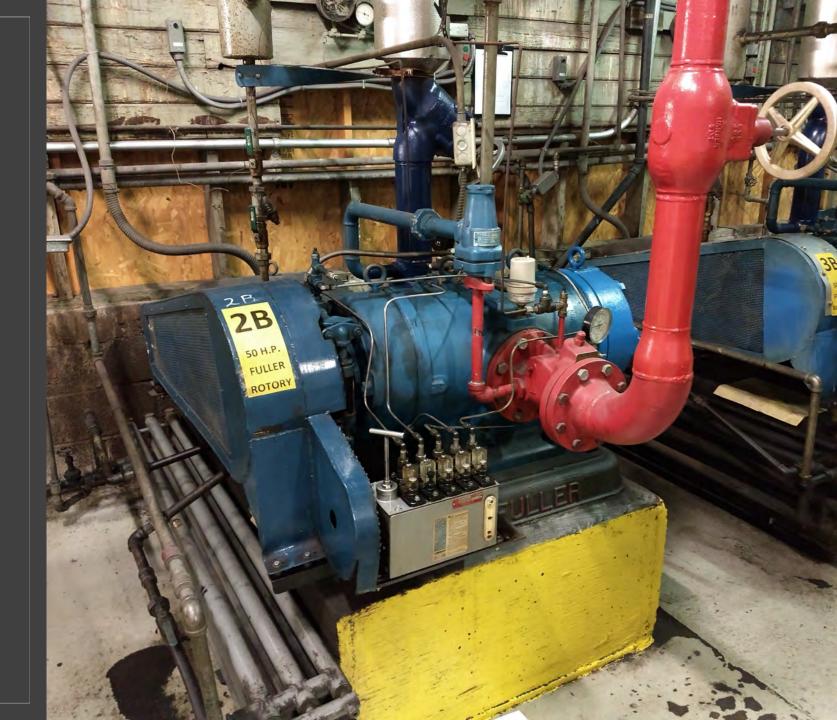


Inspect for rotor axial play in motor driven rotor shaft (annual)

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



Inspect vanes (5-years)



Check belt tension (annual)



Check pulley hub connections (annual)



Check electrical wiring for hot spots (annual)

