

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
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
 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)

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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

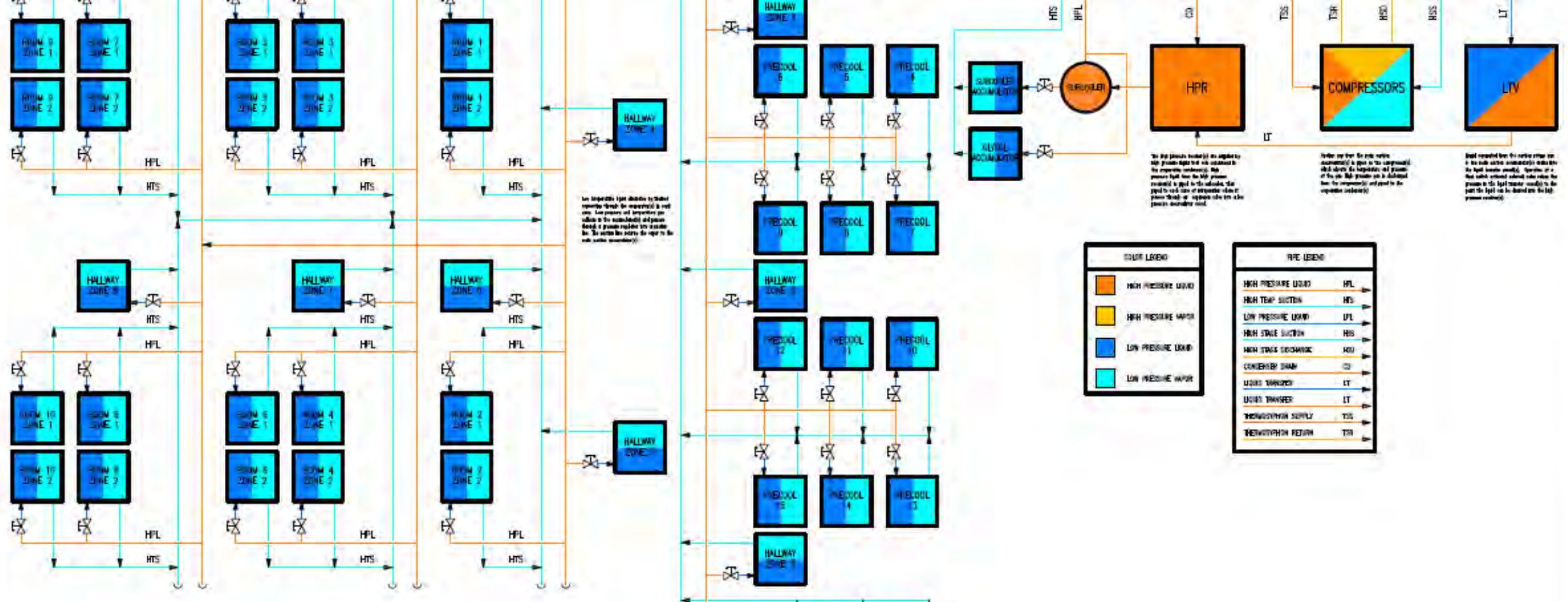
Manufacturer data reports for all pressure vessels;

Materials of construction

Equipment list

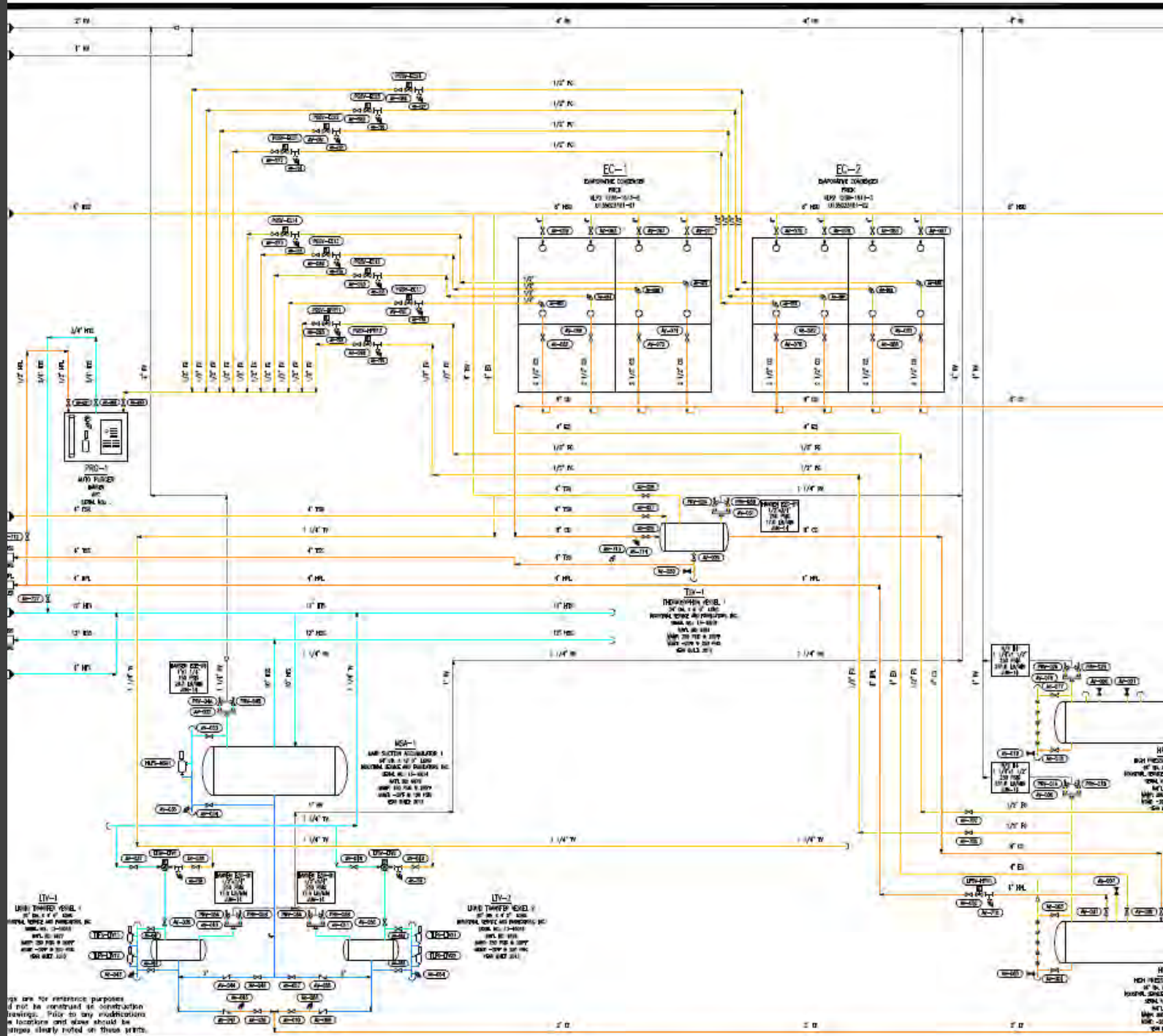
P&IDs

Record Keeping Requirements [§5.3]



FLOW DRAWINGS

FLOW DRAWINGS



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, Division 1, 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) (Mat'l Spec. No., Grade, Size, No.) (internal)

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.



evapco

Bulletin 104B

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!

Phillips

REFRIGERATION
VALVES • VESSELS • SYSTEMS • CONTROLS

LOW SIDE VALVES
Series 7015
BULLETIN 7015-11E-01
Engineering Data

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

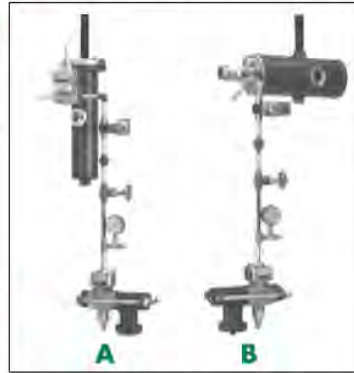
Description

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

Frick

BY JOHNSON CONTROLS

Form 070.610-IOM (NOV 2014)

INSTALLATION - OPERATION - MAINTENANCE

File: SERVICE MANUAL - Section 70
Replaces: 070.610-IOM (AUG 2014)
Dist: 3, 3a, 3b, 3c

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: Active Decommissioned All Filter Add

Advanced Search: Clear

Filter by type Show All Types ▼

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



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
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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

Break









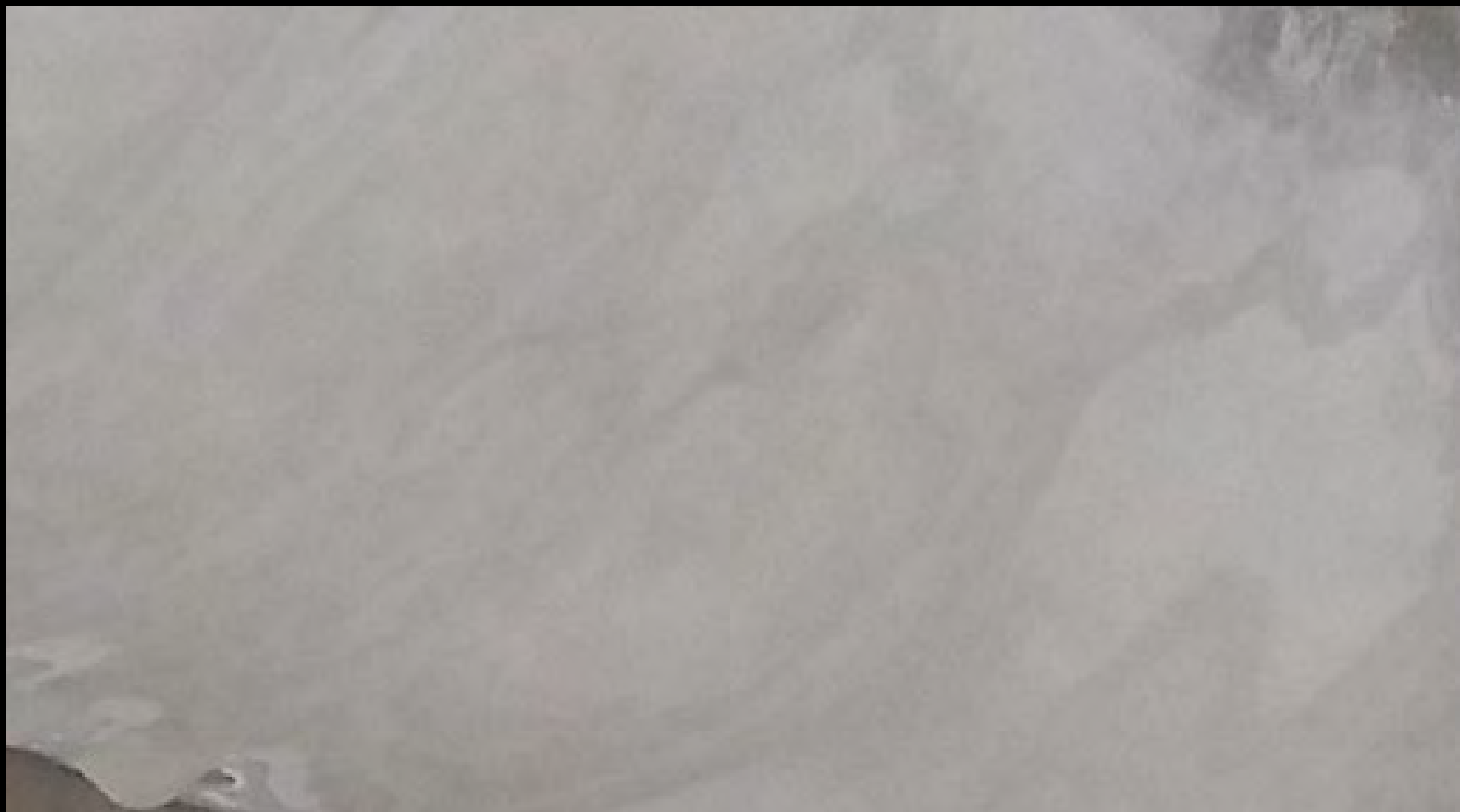




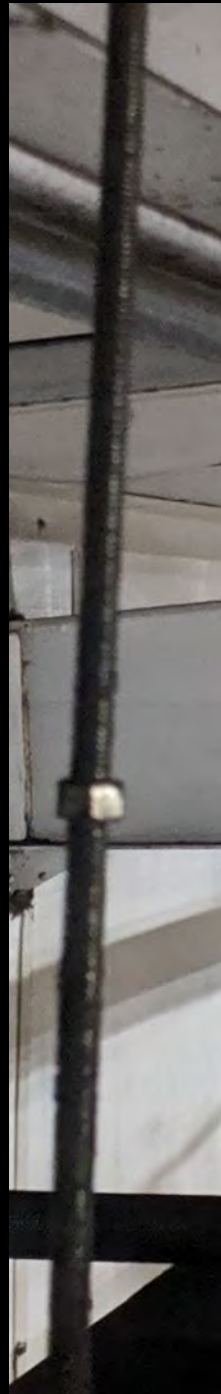


























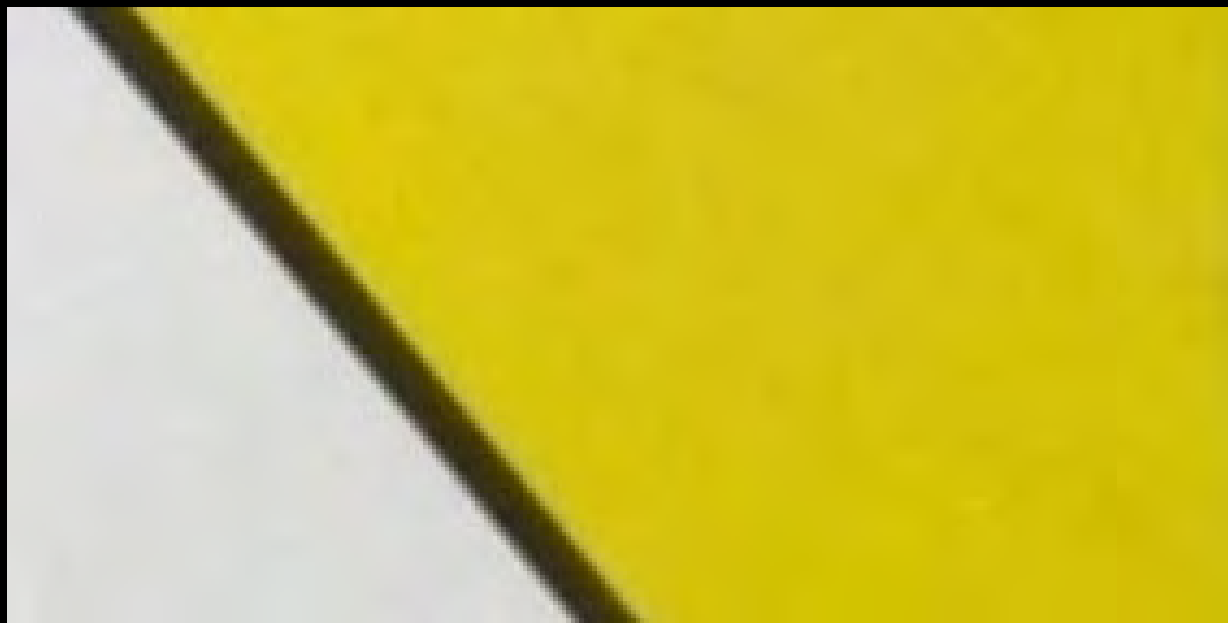














COR

Anhydrous
Ammonia

IIAR 6

Part 1 – General

Part 2 – Program Requirement

Part 3 Appendices

1 – Purpose, Scope, and Applic.

2 – Definitions

3 – Reference Standards

4 – Program Administration

5 – General

6 – Compressors

7 – Pumps

8 – Condensers

9 – Evaporators

10 – Vessels

11 – Piping

12 – Safety Systems

13 – Overpressure Protection Devices

14 - Purgers

15 – Ammonia and Secondary
Coolants

A – Explanatory Material

B – Safety Checklists

C – Water Contamination

D – Avoiding Abnormal
Pressure/Shock

E – Risk-Based ITM

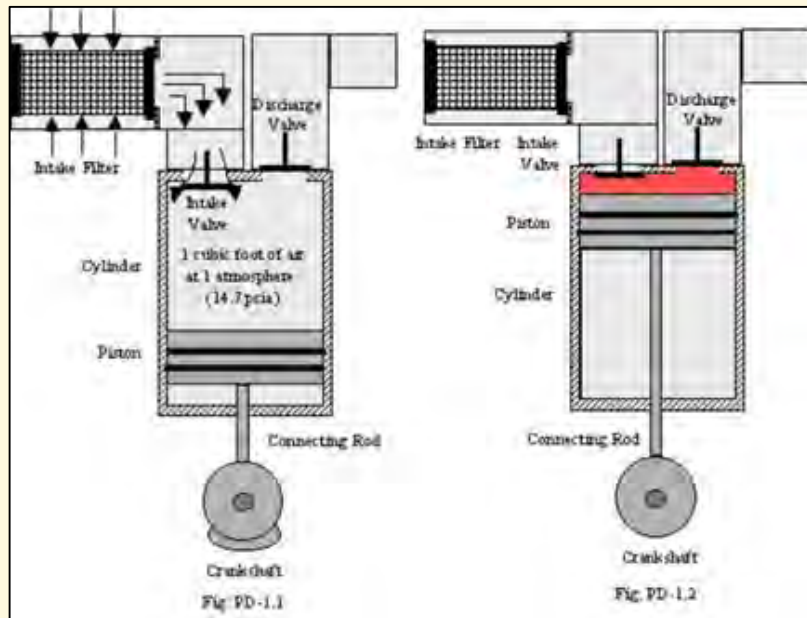
F - References

ITM Tasks [§6.1]

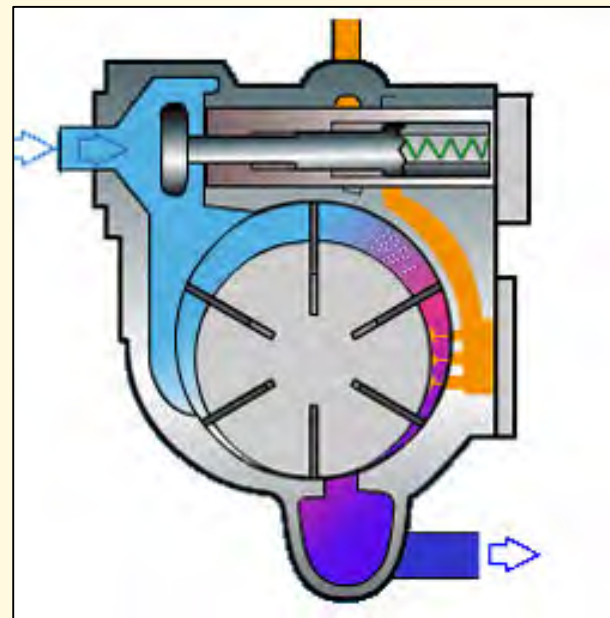
- **Inspection, Testing, and Maintenance Tasks.** ITM tasks shall be performed on the different compressor types at the indicated frequencies set forth in Table 6.1 or per manufacturers' instructions, unless a different frequency is justified in accordance with Section 5.2.1.
 - Where a history of deficiencies has been recorded, the (ITM) task frequencies shall be increased. Where a history of fault-free operation has been recorded, the (ITM) task frequencies are permitted to be decreased. In either case, a determined change in a (ITM) task frequency and its technical justification shall be documented. [§5.2.1]

Types of Compressors

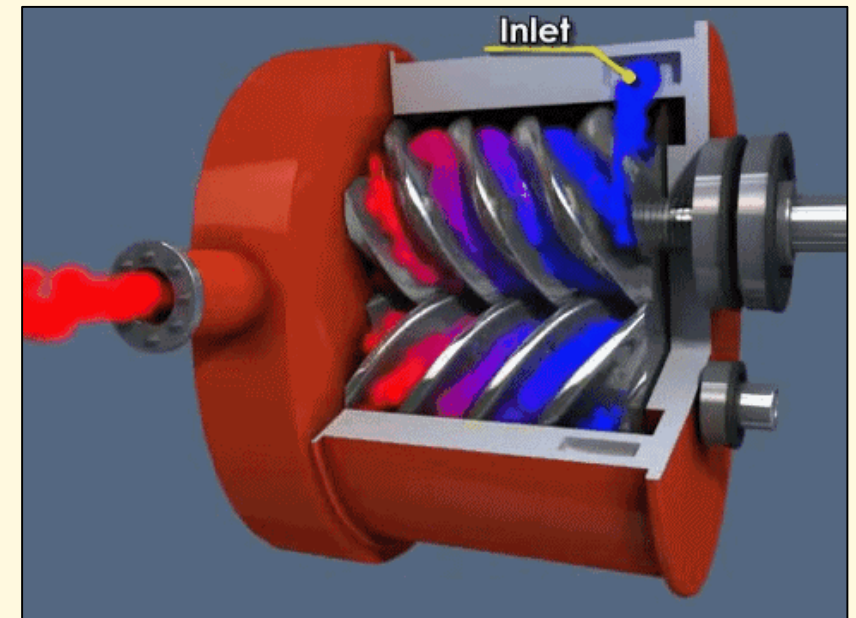
Reciprocating Compressor



Rotary Vane Compressor



Rotary Screw Compressor



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		
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

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



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

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 1	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

REFRIG COMP #2

⚠️ WARNING	
Arc Flash and Shock Hazard Present Appropriate PPE Required	
Arc Flash Hazard Boundary	1.6 ft
Incident Energy	1.37 cal/cm ²
Working Distance	18 in
Total Ibf at FCT	23.158 kA
Shock Hazard Exposure	480 VAC
Insulating Glove Class	00
Shock Hazard when covers removed	
Limited Approach Boundary	3.5 ft
Restricted Approach Boundary	1.0 ft
Equipment: COMP-2-BUS Source PDID: SUB-17-COMP-2	

CAT / IERC of
minimum size

Min. PPE
Nonmelting or
long sleeve shirt
shield for projec
glasses, Hearing
gloves.

www

AUTO START MAN RESET



AUTO LOAD UNLOAD



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

COMPRESSOR 1
SCCP-1

Quantum™ HD



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

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

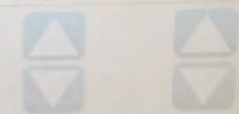
Capacity Management

Capacity Control	Setpoint
Mode 1	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

HTC2
COOLER COMP.#7

#775

EA FES Systems Inc.

Micro III



COMP C1V	COMP C1H	←	→
MOTOR M1H	COMP C2V	ZOOM IN	↑
MOTOR M2H	COMP C2H	ZOOM OUT	↓
MOTOR AXIAL	COMP AXIAL	MAG	ALARMS

OPERATING DATA

23.1 ↓

Suct 1 Setpt	24.0	Psi
Disch Press	157.1	Psi
Disch Temp	178.6	°F
Oil Diff Prs	43.7	Psi
Oil Temp	122.9	°F
Slide Valve	99.8	%
Comp Motor	463.5	Amp

CHANGE DISPLAY	↑	ENTER
←	EDIT	→
CLEAR	↓	ALARM OFF

COMPRESSOR CONTROL

STOP	SHUT-DOWNS	PWR FAIL RESET	AUTO
OIL PUMP	ALARMS		HOLD
REMOTE START	ANTI-RECYCLE OIL DRAIN		LOAD
LOCAL START	OIL HEATER	EXTL CONTRL	UNLOAD

7	8	9
4	5	6
1	2	3
•	0	+/-
CHANGE		SKIP

(C-8)
150 H.P.

MOTORTRONICS
The Refrigeration Experts

8



CONTROL POWER
DISCONNECT



COMPRESSOR MOTOR
CURRENT LIMITER



SUCTION PRESSURE
CONTROL



OPERATING TIME



STOP
RESET



AUTOMATIC
START



MANUAL
START



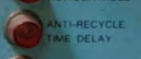
CAPACITY



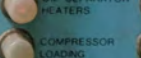
Manual
Hold
Manual
Load

Manual
Unload
Automatic
Control

REMOTE
START OR
AUX CONTROLS



ANTI-RECYCLE
TIME DELAY



START-UP
TIME DELAY



OIL SEPARATOR
HEATERS



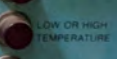
COMPRESSOR
LOADING



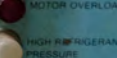
COMPRESSOR
UNLOADING



LOW OIL
PRESSURE



LOW OR HIGH
TEMPERATURE



LOW REFRIGERANT
PRESSURE



MOTOR OVERLOADS

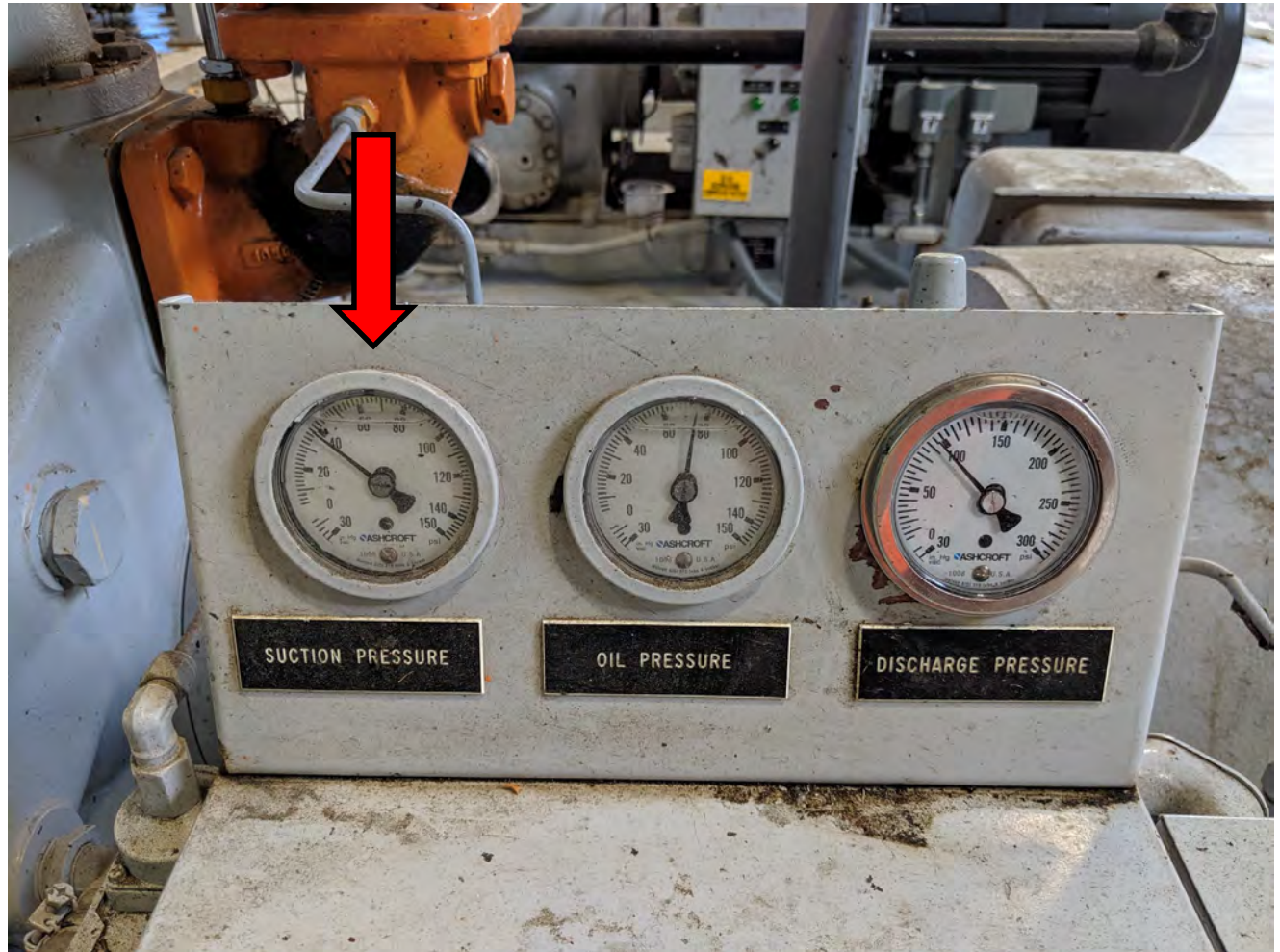
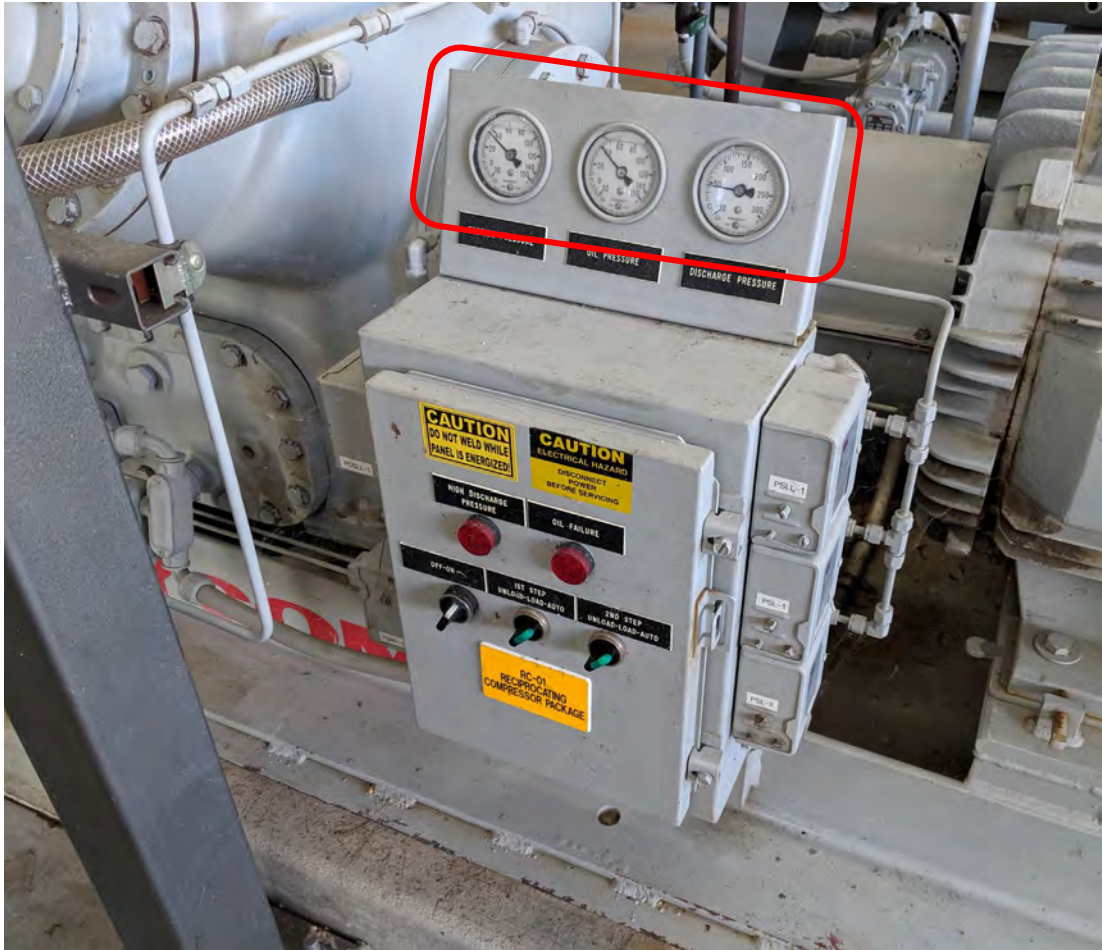


HIGH REFRIGERANT
PRESSURE



AUXILIARY CONTROLS
OR STOP SWITCH





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

nc.

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

CHANGE
DISPLAY



CLEAR

COMPRESSOR CONTROL

STOP

SHUT-
DOWNS

PWR
FAIL
RESET

AUTO

OIL

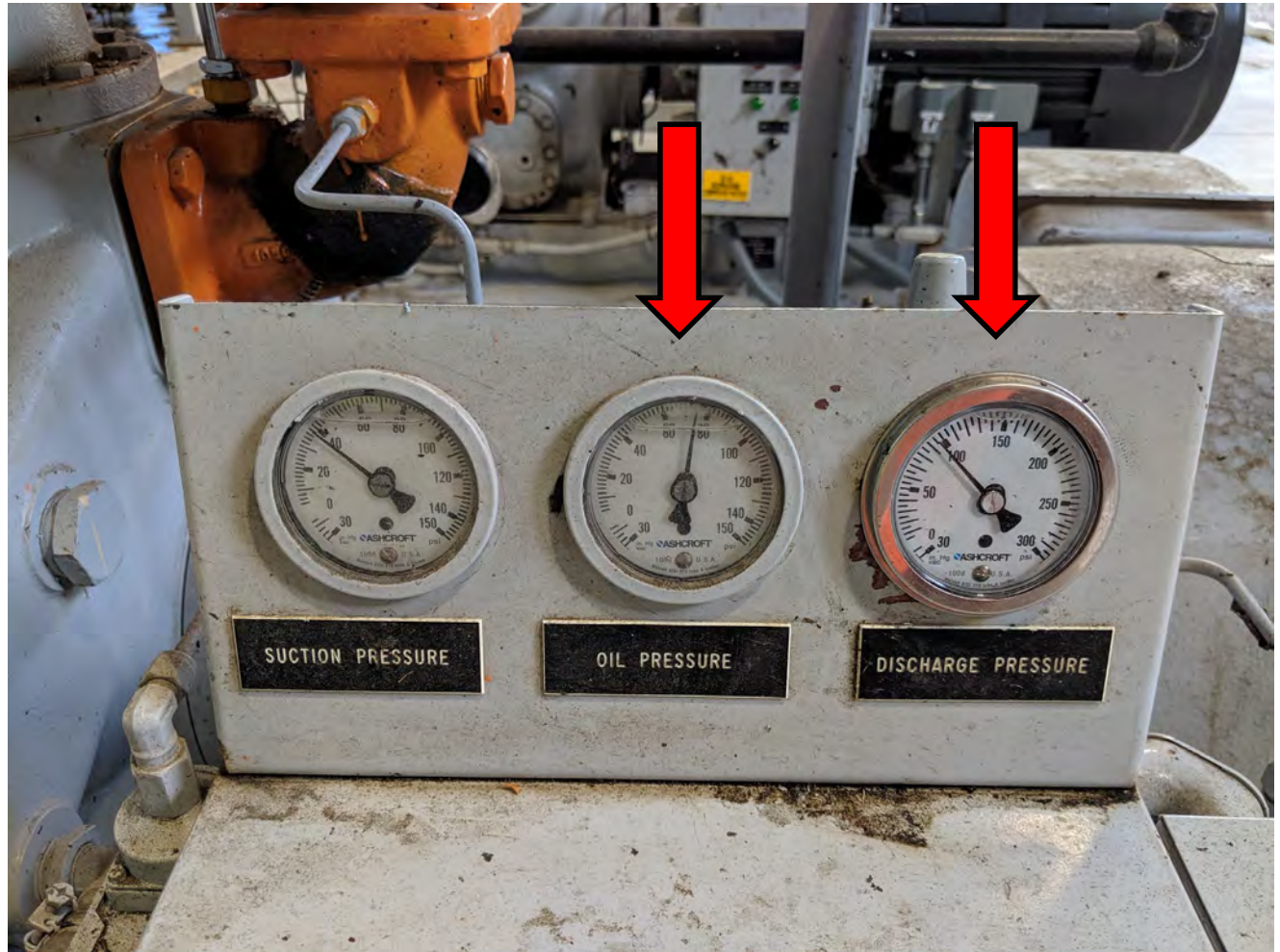
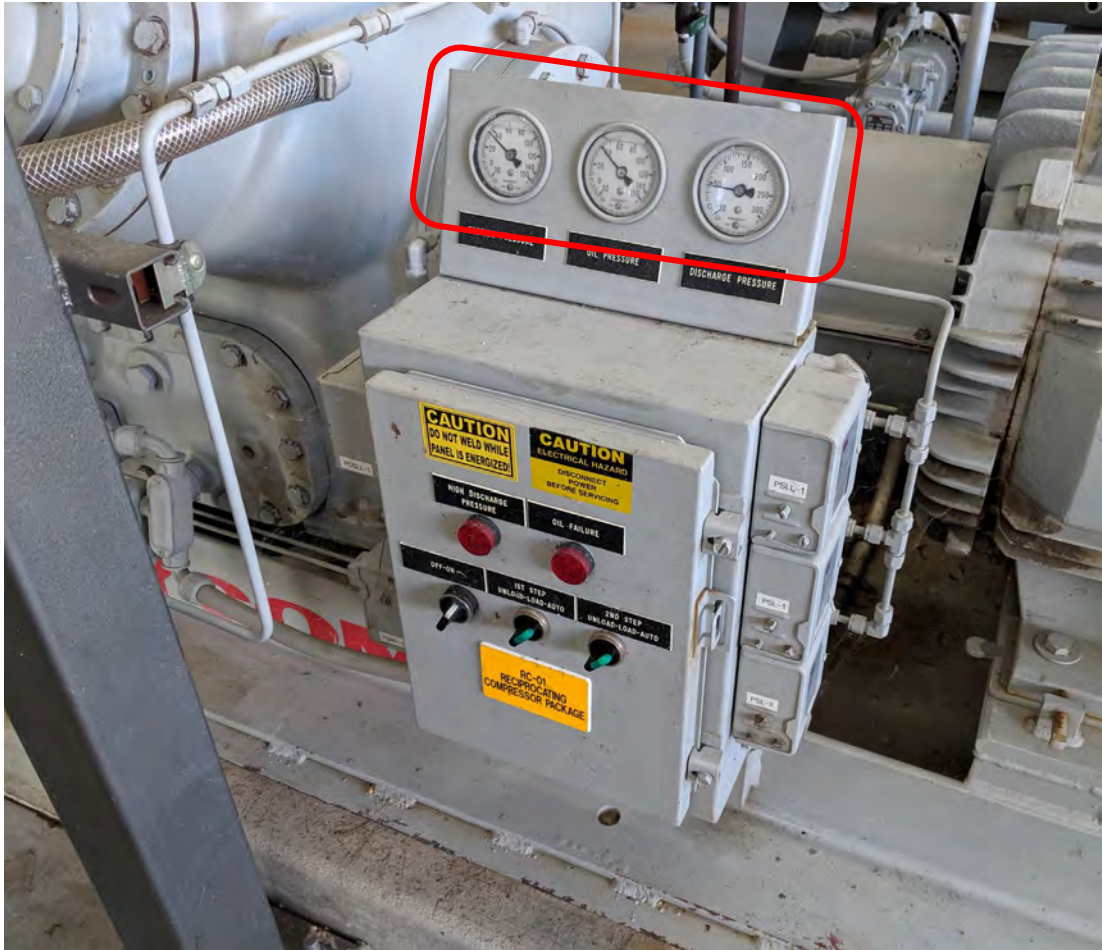
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...

HOLD

7

4



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

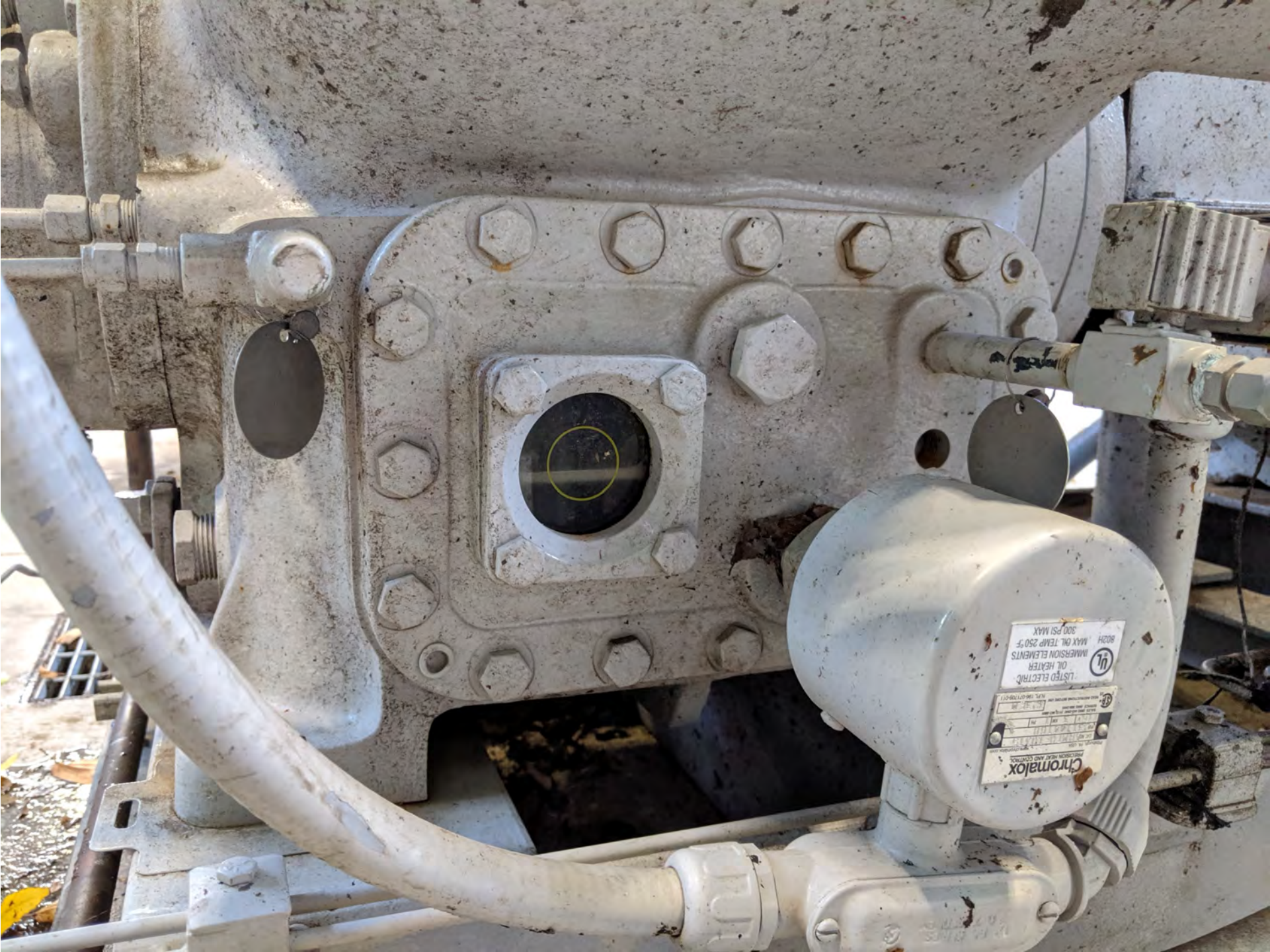
ITM Task	Frequency		
Inspection	Screw	Recip	Rotary Vane
q) Drive guard in place	D	D	D
r) Foundation solid, in place, and free from evidence of deterioration	A	A	A
s) Visually inspect mounting bolts are in place	A	A	A
t) Visually inspect metal surfaces for pitting or surface damage	A	A	A
u) Visually inspect 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		
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		
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
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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		
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		
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		
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		
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

MICRO-COLD
RECIPROCATING UNIT
JOB NO. RU-2800
MODEL NO. HSWB-DD-128
REFRIG/GAS R-717
ASSEMBLED BY
HYGOM INT'L REFRIG., TEXAS, USA





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		
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







WARNING
DO NOT OPERATE COMPRESSOR WITHOUT
COUPLING GUARD INSTALLED.

SUCTION AMMONIA

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

