GASGUARD 450 PANEL OPERATIONS
CYLINDER HANDLING
GAS PAD ORIENTATION
Right-To-Know

Prerequisites to this course are recommended:

APCI VERSION 1.4 (REV 1)
CYLINDER CHANGE SEQUENCE
AIR PRODUCTS GASGUARD 450
Corrosion, corrosion or creep, or control of damage that could result in gas panel
result of uncontrolled changes or software failure that is unfaithful to you, it may be the
procedure. Never accept a deviation in the software that is unfaithful to you. Also, be aware of programming changes. Software damage can also occur if you encounter changes or
abnormalities during the course of any cylinder change operation. Seek clarification from your supervisor before
follow and respond to all Prompts at the Gasguard 450 controller and not just those presented here.
"Action blocks" may not be represented here! Your instructor will inform you of any "Action Prompts" specific
because air products and chemicals, like software is often "customized" for each customer, customer-specific

**IMPORTANT:**

**ACCTIONS**

**OPERATOR ACTION BLOCK**

Controller display:

This process is presented through the use of Operator Action Blocks and the associated Gasguard 450
process. This process is presented through the use of Operator Action Blocks and the associated Gasguard 450
during a routine cylinder change.

**GASGUARD 450 CYLINDER CHANGE SEQUENCE**
CONTROLLER ACTIONS

GRAPHICS DISPLAY

GasGuard Guard Components Representations appear on the facing page of each action block. These graphic representations are

BEFORE PROCEEDING WITH THIS TRAINING COURSE:

1) Be familiar with all safety aspects and personnel protective equipment requirements for cylinder change.

2) Review the Glossary of Terms used at the back of this manual.

3) Review the Panel schematic at the back of this manual. Your panel type should be inserted.

4) Review any responses to ALARM CONDITIONS. You should be familiar with all aspects of GasGuard 450.

DURING THE COURSE:

Operations from GasGuard 450 Panel Operations Training (a pre-requisite for this class).

AFTER THE COURSE:

5) Retain this manual for future reference. Make notes and forward them to your instructor or supervisor for future manual improvements.

RETURN TO CONTENTS
When you first approach a Casguard 450 system in the normal operating mode the display will look like this:

**PROCESS GAS FLOW**
To stop gas flow in preparation for a cylinder change:

STOPPING GAS FLOW

1. Enter Security Code on Keypad
2. Select Main Menu Item
3. Press "Stop"

Press "Enter"

These actions "Stop Process GAS FLOW":"
remailing process gas from the system:

Now that process gas flow is stopped, you are ready to close the cylinder value and purge the

INITIAL PRE-PURGE
CLOSING CYLINDER VALVE
STOPPED PROCESS GAS
If you have a Manual Cylinder Valve it is NOT CLOSED when you

STOPPED PROCESS GAS
If you have a Pneumatic Cylinder Valve it was CLOSED when you

CLOSING CYLINDER VALVE INITIAL PRE-PURGE (continued)
YOU MUST BEGIN THE CYCLE OVER AGAIN WHEN ANY SHUTDOWN OCCURS!

"USER ENTRY TIMEDOUT"
Throughout this manual references to this Shutdown Sequence of events will be made as

Screen Prompts "USER ENTRY TIMEDOUT"
Red Shutdown LED Flashes
Horn Annunciation
Sequence Shuts Down

The following actions occur:

If at any time during a "Prompt" for an operator action you do not respond within a user programmed time,

from the Automatic Control Valve or CLOSED the manual Cylinder Valve
"LOW Pressure Vent" AFTER you pushed "ENTER" after you DISCONNECTED the Pneumatic Line

The controller will then begin the process gas evacuation from the panel through the

PANEL EVACUATION
STOP THE CHANAGE PROCCESS and NOTIFY YOUR SUPERVISOR

REMEMBER: If any of these checks FAIL - You will receive "LOW VACUUM" prompts

from the high pressure vent side of the panel.

High Pressure Vent Valve (V5) opens to remove remaining "trapped" process gas

on the diaphragm (high pressure side)

High Pressure Process Valve (V2) and Emergency Shutoff Valve (V1) on the diaphragm open. The controller checks to ensure vacuum exists

at pressure transducer #2 (Pt2) in the panel process delivery side (low pressure side)

Low Pressure Vent Valve (V6) opens. The controller checks to ensure vacuum exists

at pressure transducer #5 (Pt5) in the panel vent

Vacuum Venturi Supply Valve (V7) opens. The controller checks to ensure vacuum exists

(continued)

Panel evacuation
CLOSED
PROCESS CYLINDER VALVE (V0)
VENT
THROUGH LOW & HIGH PRESSURE
PANEL EVACUATION
If cylinder valve is not leaking by, Main Purge Cycle will automatically begin.

STOP THE CHARGE PROCESS AND NOTIFY YOUR SUPERVISOR
LOW VACUUM or CYLINDER LEAKING
If ANY OF THE ABOVE CHECKS FAIL YOU WILL RECEIVE PROMPTS:

Pressure Transducer #1 (PT1) is monitored for pressure rise (> 5 psig) for a user-defined period of time (5 minutes is the minimum). A pressure increase would indicate that the cylinder valve is leaking by.

ALL VALVES ON THE PANEL ARE NOW CLOSED!

Vacuum Venturi Supply Valve (V7) closes
Pressure Vent Valve (V5) close.
Emergency Shut-off Valve (V1), High Pressure Process Valve (V2), Low Pressure Process Valve (V6), High

The "PREPURGE CYCLE" has now evacuated remaining process gas from the panel

CYLINDER VALVE LEAK CHECK
These actions pull a vacuum to the closed cylinder valve for 15 seconds.

Emergency Shutoff Valve (V1) on the digital opens.

High Pressure Vent Valve (V5) opens.

At pressure transducer #5 (PT5) on the digital
Vacuum Venturi Supply Valve (V7) opens. The controller checks to ensure vacuum exists.

Venturi Vacuum Cycle

MAIN PURGE - HIGH PRESSURE SIDE
The controller checks to ensure that pressure exists (> 70 psig) at pressure transducer #1 (PT1) in the Pigtail.

After 5 seconds, Pigtail Purge Gas Isolation Valve (V9) close.

After 5 seconds, Pigtail Purge Gas Inlet Valve (V4).

After short delay, High Pressure Vent Valve (V5) closes.

Pigtail Purge Gas Isolation Valve (V9) open to "draw" purge nitrogen into high pressure side.

High Pressure Vent Valve (V5) closes. The controller checks to ensure vacuum exists.

Purge Nitrogen Cycle

MAIN PURGE - HIGH PRESSURE SIDE
The controller checks to ensure vacuum exists.

After 10 seconds, low pressure vent valve (V6) closes.

Low pressure vent valve (V6) opens.

At pressure transducer #5 (P75) on the piggieback, vacuum venturi supply valve (V7) opens. The controller checks to ensure vacuum exists after completion of the high pressure purge cycles.

Final evacuation is a step performed to leave the panel under vacuum.

**Final evacuation - Pre Purge**
Controller will display "BEGIN CHANCE CYLINDER".

Valves V1, V5, and V7 close. At this point all valves on panel are closed.

After all checks pass, panel is under vacuum.

After 10 seconds, the controller checks to ensure vacuum exists.

After brief delay, Emergency Shutdown Valve (V1) opens.

High Pressure Vent Valve (V5) opens.

(continued)

FINAL EVACUATION - PRE PURGE
STOP THE CHANGE PROCESS AND NOTIFY YOUR SUPERVISOR

IF THIS CHECK FAILS:

This is to ensure that cylinder valve has not leaked by.
The controller will check pressure transducer #1 (PT1) in the digital to ensure vacuum still exists.

CHANGE CYLINDER

1. Enter security code on keypad
2. Select main menu item
3. Press "START"
   CHANGE CYLINDER
   with up / down arrow keys
In these steps the process cylinder will be replaced.
If it takes longer, you will receive "USER ENTRY TIMEDOUT" prompt and cycle must be re-started.

You are allowed 30 minutes to change purge cylinder.

You must change if you have sufficient purge gas to complete purge cycles.

You will be prompted to check the nitrogen purge gas cylinder. If it is less than 200 psig,

1. Push "ENTER" when LESS THAN 200 psig.
2. Push "ENTER" when PURGE CYLINDER REPLENISHMENT COMPLETE.

It is recommended that you close the Process Line Isolation Valve (MLV).

To further protect the process line during cylinder removal,
If it takes longer, you will receive USER ENTRY TIMOUT prompt and cycle must be re-started. Step is failed. You are allowed 60 minutes to complete change-out.

Hand connect CGA fitting. Tighten with torque wrench while using a second wrench to hold pigtail. Ensure that cylinder hand connected CGA fitting. Tighten with torque wrench while using a second wrench to hold pigtail. Ensure that cylinder is the correct gas and valve type. Insert in reverse order - use new gasket if gas is vacuum type. CGA fitting is used.

completes the cylinder CGA. Install the cylinder valve protector cap and remove the cylinder from cabinet. Ensuring that the new flow of nitrogen purge gas from the pigtail will be heard. Complete the CGA disconnection by hand. Insert flow cap on outward.

Using two wrenches, one to hold the pigtail and the other to turn the CGA nut, loosen the CGA connection. An outward

If your pigtail is equipped with a pneumatically actuated "Cylinder Safe Flag" it is labeled V10 and opens

Emergency Shutdown Valve (V1) on the pigtail opens. Controller checks to ensure that pressure exists

Pressure Transducer #1 (PT1) (≥ 70 psig) at pigtail transducer #1 (PT1)

Pressure Transducer #2 (PT2) at pigtail purge gas inlet valve (V4) opens. Controller checks to ensure vacuum exists (< -10 psig)

System and potentially contaminating the pigtail with moisture. From the pigtail while it is disconnected from the cylinder. This prevents air from getting "back into the

In this step a nitrogen purge will be introduced to allow continuous nitrogen flow

CHANGE CYLINDER (continued)
PROCESS CYLINDER REMOVED
THROUGH RETAIL
TRICKLE INFLUENT PULSE
CHANGE CYLINDER

VENT

TOOL

NITROGEN
Controller closes Piggay purge gas inlet valve (V4) and emergency shut-off valve (V1).

Piggay pressure transducer #1 (PT1) is continuously checked for > 70 psig - CGA connection integrity.

Enter this NET PRODUCT WEIGHT as the FULL CYLINDER WEIGHT.

This will ensure correct scale weight entries and eliminate pre-mature product run-out.

ALWAYS CHECK TO BE SURE YOU KNOW THE WEIGHT OF A LIQUID PRODUC'T.

(2) Reading weight from manufacturer's label on cylinder (where it exists).

OR

(1) Weighing the cylinder on a separate scale. Subtract liquid weight (stamped on cylinder) from gross weight.

FULL CYLINDER weight should have been determined prior to starting this change by either:

1. A PROMPT: ENTER THE LIQUID WEIGHT
2. PROMPT: ENTER WHEN COMPLETE

ON LIQUID PRODUCTS ONLY
ENTRY OF PRODUCT WEIGHT

If your Piggay is equipped with a pneumatically actuated "Cylinder Safe Flag" (V10), it closes.

(continued)

CHANGE CYLINDER
After Pressure Decay Test #1 passes, panel moves to Final Evacuation prior to Helium Leak Check.

This confirms Cylinder Valve closure - No leak past Seat i.
Pressure drop for user-defined amount of time (5 minutes minimum)
Pressure drop for < 5 psig

Pressure Decay Test #1 is conducted. Controller monitors Pressure Transducer #1 (PT1) for < 5 psig

High Pressure Vent Valve (V5) and Venturi Supply Valve (V7) close.

High Pressure Vent Valve (V5) and Venturi Supply Valve (V7) close.

Vacuum exists (< -10 psig)

Vacuum Venturi Supply Valve (V7) opens. Controller checks pressure transducer #5 (PT5) to ensure

The panel is now evacuated to validate a Pressure Decay Test at the CGA connection.

(continued)

CHANGE CYLINDER
At pressure transducer #1 (P1) in the pigtail:

After 10 seconds, the controller checks to ensure vacuum exists.

After brief delay, Emergency Shutoff Valve (V1) opens.

High Pressure Vent Valve (V5) opens.

At the panel process delivery side:

The controller checks to ensure vacuum exists at pressure transducer #2 (P2).

After 10 seconds, Low Pressure Vent Valve (V6) closes.

Low Pressure Vent Valve (V6) opens.

At pressure transducer #5 (P5) on the pigtail:

Vacuum Venturi Supply Valve (V7) opens. The controller checks to ensure vacuum exists.

After completion of the cylinder changeout:

Pre-LEak Check evacuation is performed to leave the panel under vacuum.

Pre-Helium Leak Check Panel Evacuation
System is ready for Helium Leak Check.

Controller will prompt "Ready to Continue".

All valves on panel are closed.

Valves V1, V5 and V7 close.

Panel is under vacuum.

(continued)

Pre-Helium Leak Check Panel Evacuation
You should be trained in helium leak detector operations.
You should have all helium leak detector warmed up and ready to go at this time.

Both Inboard and Outboard Helium Leak Check cycles will be presented here.
The leak check type has been pre-selected during the cabinet configuration.
At this point, either an Inboard OR an Outboard Helium Leak Check cycle will commence.
(To allow Helium/nitrogen mixture to cylinder valve)

To ensure pressure exists (>70 psig)

Emergency Shutoff Valve (V1) open, Controller checks pressure transducer #1 (PT1)

Pigtail Purge Gas Inlet Valve (V4), Pigtail Purge Gas Isolation Valve (V9), and

but argon can be used

Usually helium is mixed with the purge gas (referred to here as nitrogen).

Perform an Outboard Helium Leak Check. This section will define the controller's sequence and operator interface for

OUTBOARD HELIUM LEAK CHECK
OUTBOARD HELIUM LEAK CHECK is complete. "CHANGE CYLINDER CYCLE" continues.

Pigtail
Purge Gas Isolation Valve (V9) close.
Emergenc y Shutoff Valve (V7), Pigtail
Purge Gas Inlet Valve (V4), and

If it takes longer, you will receive "USER ENTRY TIMEDOUT" prompt and
You are allowed 60 minutes to complete leak test.

Ensure CSA connection is properly "sniffed" for Helium i

2. Push "ENTER" when

OUTBOARD HELIUM LEAK CHECK

The cylinder valve connection - and any other pigtail mechanical connection in the process flow stream.
High Pressure Vent Valve (V5) closes

High Pressure Vent Valve (V5) opens. Pressure transducer #1 (PT1) is checked for > 5 psi.

Purge Gas Inlet Valve (V4), and Pigtails Purge Gas Isolation Valve (V9) close.

INTEL METHOD (NO TRICKLE PURGE):

This ensures that an inert environment exists at CGA connection.
Open controller checks Pressure transducer #1 (PT1) to ensure pressure exists - < 70 psi.
Purge Gas Inlet Valve (V4), Pigtails Purge Gas Isolation Valve (V9), and Emergency Shutoff Valve (V1). Helium from a small cylinder is used to "spray" in the connection leak-check ports.

To perform an Inboard leak check, a helium source is necessary.

AIR PRODUCE uses trickled purge to avoid exposing High Pressure Vent Valve seat to atmosphere.

INTEL uses NO-trickled purge to avoid possible pressurization and damage to Helium leak detector.

Pay particular attention to the different steps for each

There are TWO VERSIONS - One with trickled purge to leak detector during connection and one without.

This section defines the controller sequence and operator interface for an Inboard Helium Leak Check.

INBOARD HELIUM LEAK CHECK
This will allow trickle purge during Helium Leak Detector connection.

- To allow purge nitrogen to high pressure vent side of panel.
  Pigtail Purge Gas Inlet Valve (V4) and High Pressure Vent Valve (V5) open.

APCI METHOD (TRICKLE PURGE):

(continued)

INBOARD HELIUM LEAK CHECK
You are ready to connect leak detector.

1. At prompt: "Close MV22"
2. Push "ENTER" when
Complete

You will receive a prompt to close vent isolation valve (MV22) to allow connection of the leak detector to

(continued)

INBOARD HELIUM LEAK CHECK
BOTH INLET and AIR PRODUCTS METHOD at the same state.

Controller checks pressure transducer #1 to ensure vacuum from pump exists (> 5 psig).

INLET METHOD ONLY: High Pressure Vent Valve (V5) opens.

AIR PRODUCTS METHOD ONLY: Purge Gas Vent Valve (V4) closes.

Remember: USE NEW GASKET!

INBOARD HEAVY LEAK CHECK (continued)

1. AIR Products METHOD ONLY: TL Heleum Leak Detector Connection
2. Push ENTER when detector is connected
detector will be tested at this step.

1. AIR Products METHOD ONLY: TL Heleum Leak Detector Connection

2. Push ENTER when detector is connected

tester will be tested at this step.

1. AIR Products METHOD ONLY: TL Heleum Leak Detector Connection

2. Push ENTER when detector is connected

tester will be tested at this step.

1. AIR Products METHOD ONLY: TL Heleum Leak Detector Connection

2. Push ENTER when detector is connected

tester will be tested at this step.

1. AIR Products METHOD ONLY: TL Heleum Leak Detector Connection

2. Push ENTER when detector is connected

tester will be tested at this step.

1. AIR Products METHOD ONLY: TL Heleum Leak Detector Connection

2. Push ENTER when detector is connected

tester will be tested at this step.

1. AIR Products METHOD ONLY: TL Heleum Leak Detector Connection

2. Push ENTER when detector is connected

tester will be tested at this step.
Ensure CGA connection is properly "sprayed" with helium.

1. At Prompt: "DISC NOW"
   - Ready for He LEAK TEST
2. Push ENTER when CGA connection leak check ports
   - Spray helium in CGA
   - READY FOR HE LEAK TEST
   - At Prompt: "DISC NOW"

Check and BEFORE pressing enter if DAMAGE TO PUMP CAN RESULT from pressure surge!

AIR PRODUCTS METHOD ONLY: Be sure to BYPASS helium leak detector AFTER completing leak check.

Emergency Shutoff Valve (V4) and purge gas inlet valve (V4) close.
Purge Gas Inlet Valve (V4) opens. PT1 is checked to ensure >70 psig.
High Pressure Vent Valve (V5) closes.

INTEL METHOD ONLY: You will receive "USER ENTRY TIMEDOUT" prompt and cycle must be re-stated.
You are allowed 60 minutes to complete leak test. If it takes longer,

INBOARD HELIUM LEAK CHECK

(continued)
Air Products METHOD ONLY: High Pressure Vent Valve (V5) and Purge Gas Inlet Valve (V4) close.

You will receive "USER ENTRY TIMED OUT" prompt and cycle must be re-started.
You are allowed 30 minutes to complete leak detector disconnected. If takes longer,

Remember: USE NEW GASKET!

You will now disconnect helium leak detector:

A nitrogen purge is re-established to helium leak detector port.
High Pressure Vent Valve (V5) opens.
Emergency Shutoff Valve (V1) closes.
PTT is checked to ensure <70 psig.
Purge Gas Inlet Valve (V4) opens.

Air Products METHOD ONLY: High Pressure Vent Valve (V5) close.

Inboard Helium Leak Check (continued)
"CHANGE CYLINDER CYCLE" Continues.

Inboard Helium Leak Check is complete.

1. At prompt: OPEN MV22.
2. Push ENTER when Complete.

You will now re-establish High Pressure Vent by closing MV22.
If you closed the Process Isolation Valve (MV9) earlier, re-open it now:

1. At Pump, open MV-9 Process Line
2. Push ENTER when Isolation Valve Complete

ONLY IF CYLINDER CGA CONNECTION IS NOT LEAKING AND HAS PASSED Helium Leak Check

Change Cylinder (continued)
Cylinder Connection is complete.

If you have a Pneumatic Cylinder Valve, you will connect the pneumatic line now:

1. At prompt: UNLOCK
2. Push ENTER when Pneumatic Line ACV AND INSTALL

Complete
YOU MUST BEGIN THE CYCLE OVER AGAIN WHEN ANY SHUTDOWN OCCURS!

STOP THE CHANGING PROCESS AND NOTIFY YOUR SUPERVISOR.

"LOW VACUUM"

IF ANY OF THE ABOVE CHECKS FAIL YOU WILL RECEIVE PROMPTS:

Remember:

- In the panel process delivery side.
- At pressure transducer #5 (P15) on the digital
  The controller checks to ensure vacuum exists.

After 10 seconds, Low Pressure Vent Valve (V6) closes:

Low Pressure Vent Valve (V6) opens.

At pressure transducer #5 (P15) on the digital
  The controller checks to ensure vacuum exists.
  The Vacuum Supply Valve (V7) opens. The controller checks to ensure vacuum exists.

Final Evacuation is a step performed to remove any residual purge gas prior to start of purge.

FINAL EVACUATION - CHANGING CYLINDER
Controller will display "BEGIN POST PURGE".

Pressure transducer #1 (PT1) is enabled to monitor cylinder valve for leakage ( > -5 psig).

Valves V1, V5 and V7 close. At this point ALL VALVES ON PANEL ARE CLOSED.

After all checks pass, panel is under vacuum.

At pressure transducer #1 (PT1) in the pigtail after 10 seconds, the controller checks to ensure vacuum exists.

After brief delay, the Emergency Shutoff Valve (V1) opens.

High Pressure Vent Valve (V5) opens.

(continued)

FINAL EVACUATION - CHANGE CYLINDER
EMERGENCY SHUTOFF VALVE (VT1) OPEN.
Purge Gas Inlet Valve (V4), Purge Gas Isolation Valve (V9).
To ensure that system has reached at vacuum (NO cylinder valve leak).
Controller verifies that vacuum exists (> -5 psig) at pressure transducer #1 (PT1).

Now you can begin Post Purge Cycle to remove any air from system prior to opening new cylinder:

Post Purge Cycle
STOP CHANGE PROCESS and NOTIFY YOUR SUPERVISOR

If Check Fails:

is not leaking under purge gas pressure.
This confirms that cylinder CGA connection

User-defined period of time - APCI minimum is 10 minutes.
Controller checks pressure transducer #1 (PT1) for < 5 psig pressure drop for
DECAY TEST for CGA connection integrity performed now:

ensures pressure exists)
This step validates next step "Pressure Decay Test"
(PT1) < 70 psig and PT2 > 10 psig
Pressure transducer #1 (PT1) and pressure transducer #2 (PT2) are enabled:

Purge Gas Inlet Valve (V4) and Purge Gas Inlet Isolation Valve (V9) close.
The high pressure side of the panel is pressurized to the cylinder valve with purge gas.
ALL VALVES ON PANEL ARE CLOSED AND HIGH PRESSURE PURGE CYCLE BEGINS

Pressure transducers PT1 and PT2 vacuum checks end.

Emergency Shutdown Valve (V1) close
High Pressure Vent Valve (V5), Vacuum Venturi Supply Valve (V7), and Pressure Transducer #1 (PT1) is enabled to monitor vacuum (> -10 psig) at CGA connection.

Pressure Transducer #1 (PT1) opens.
High Pressure Vent Valve (V5) open.
Vacuum Venturi Supply Valve (V7) open. Pressure Transducer #5 (PT5) is checked for vacuum.

(continued)

POST PURGE CYCLE
ENTER
SHIFT
9
0
W
V
X
Y
Z
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z
9
8
7
6
5
4
3
2
1
ACK
↑
↓
→
←
→
ESC
ALL VALVES ON PANEL CLOSED
PROCESS GAS STOPPED
START
POWER
STOP
Process Cylinder
Process Cylinder
Vent
Tool
Home
Hose
Hose
Hose
These actions pull a vacuum to the closed cylinder valve for 15 seconds.

Emergency Shutoff Valve (V1) on the pipeline opens.

High Pressure Vent Valve (V5) opens.

At pressure transducer #5 (PT5) on the pipeline vacuum Venturi Supply Valve (V7) opens. The controller checks to ensure vacuum exists.

Venturi Vacuum Cycle

Main Purge - High Pressure Side
The controller checks to ensure higher pressure exists (> 70 psig) at each pressure transducer #1 (PT1) in the pigtail.

After 3 seconds, the pigtail purge gas isolation valve (V9) closes.

After 5 seconds, the pigtail purge gas inlet valve (V4) closes.

After short delay, the high pressure vent valve (V5) closes.

Pigtail purge gas isolation valve (V9) opens to "draw" purge nitrogen into high pressure side.

High pressure vent valve (V5), pigtail purge gas inlet valve (V4), and at pressure transducer #1 (PT1) in the pigtail.

High pressure vent valve (V5) closes. The controller checks to ensure vacuum exists.

**Purge Nitrogen Cycle**

**MAIN PURGE - HIGH PRESSURE SIDE**
YOU MUST BEGIN THE CYCLE OVER AGAIN WHEN ANY SHUTDOWN OCCURS!

STOP THE CHARGE PROCESS AND NOTIFY YOUR SUPERVISOR

LOW VACUUM

IF ANY OF THE ABOVE CHECKS FAIL YOU WILL RECEIVE PROMPTS:

Remember:

- in the panel process delivery side.
- at pressure transducer #2 (P12)
- The controller checks to ensure vacuum exists.

After 10 seconds, low pressure vent valve (V6) closes.

- Low Pressure Vent Valve (V6) opens.
- at pressure transducer #5 (P7) on the digital
- The Vacuum Supply Valve (V7) opens. The controller checks to ensure vacuum exists.

Final Evacuation is a step performed to remove any residual purge gas prior to start of purge.

FINAL EVACUATION - POST PURGE
You ARE READY TO START "PROCESS GAS FLOW"

Controller will display "BEGIN PROCESS GAS".

Valves V1, V5 and V7 close. At this point ALL VALVES ON PANEL ARE CLOSED.

After all checks pass, panel is under vacuum.

At pressure transducer #1 (P1) in the digittal.
After 10 seconds, the controller checks to ensure vacuum exists.

After brief delay, the Emergency Shutdown Valve (V1) opens.

High Pressure Vent Valve (V5) opens.

(Continued)

FINAL EVACUATION - POST PURGE
Pressure Transducer #1 (PT1) is opened and closed. Controller checks to ensure vacuum exists at 5 psig.

Emergency Shutoff Valve (VT1) is open and closed. Controller will check for ensure vacuum exists at 5 psig.

This prevents starting process gas flow into an improperly purged panel.

The Controller will check to ensure that a pre or post purge cycle was just completed.

STARTING PROCESS GAS FLOW

1. Enter Security Code on Keypad
2. Select Main Menu Item
3. Press "Start"

To start gas flow from the new cylinder perform these actions:
IF YOU HAVE A MANUAL CYLINDER VALVE YOU WILL BE PROMPTED:

1. A Prompt: Open Manual Cylinder Valve
2. Push ENTER when Cylinder Valve Complete

Sudden gas discharge to a panel that has been discharged (cylinder charge). This is for operator protection in the event of a Remote Stair is used to remove the operator from the cabinet vicinity during introduction of process gas.

IF YOU HAVE A REMOTE START SWITCH WITH A PNEUMATICALLY ACTUATED CYLINDER VALVE

Proceed to Remote Switch Required
NO ENTER COMMAND
SWITCH TO START FLOW
1. A Prompt: Press Remote
and Press to Start Flow
3) Report to Supervisor Immediately
2) Clear the Area
1) Press "STOP" Button
If you notice any abnormalities:

This is a critical time for panel reset.

Pressure Transducer #2 (PT2):

< 5 psig (at pressure transducer)

Emergency Shutoff Valve (V1) opens completely. The controller checks to ensure pressure exists.

Gas to regulator. This avoids regulator "pressure shock."

Emergency Shutoff Valve (V1) "Flashsheet" open (value cycles on for 3 seconds to slowly introduce process

High Pressure Process Isolation Valve (V2) opens.

Pressure exists (< 0 psig) - verifiable cylinder valve open

Automatic Cylinder Valve (V0) opens. Controller checks pressure transducer #1 (PT1) to ensure

Process gas begins to flow when you push "ENTER" for manual cylinders

(continued)

Starting process gas flow
Communicate proper Change Completion notification if required.

Check and adjust final delivery pressure.

Process gas is now flowing to tool.

On manual cylinder valve systems: emergency shutoff valve (V1) opens.
On automatic cylinder valve systems: Automatic cylinder valve (VO) opens.

Process gas flow starts:
Pressure transducer #1 (P1) is checked for > 70 psig and excess flow alarm is disabled.
If not a switchover or if adjacent panel is not in process gas mode

If this panel will remain in "standby":

This panel will remain in "standby" if this is a switchover system and adjacent panel is in "Process Gas Mode:"

Manual cylinder valves V1 and V2 remain open on Manual Systems at this point (V1 close, V2 open)
V1 and V2 remain open on Automatic Cylinder Valve System at this point (V0 close, V1 open).


Pressure at pressure transducer # 2 (P3) < 5 psig.
Controller checks to ensure pressure exists at BOTH pressure transducer #1 (P1) > 0 psig and

For Auto Switchover: Leave Manual Cylinder Valve OPEN.
Automatic Cylinder Valve (VO) closes.

(continued)

Starting process gas flow.

(continued)
"Isolate Pumper and Open Bypass"

"Close Manual Cylinder Valve"

Or

"Detach Pneumatic Line and Manually Lock ACV"

The controller will lead you through the following prompts:

Select "ROUGH LINE EVACUATION" from main menu using security code for entry.

To access this routine:

This routine will only briefly be explained here.

This routine must be combined with a minimum 20-cycle purge through the tool.

For maintenance:

intended to reduce exposure of the tool chamber to process gas during line evacuation and protection.

This is a Rough Line Evacuation Only.

Low Pressure Vent under venturi vacuum.

This routine is used to remove gross pressure gas from the process line to the tool through the

This software is equipped with a "Rough Line Evacuation" Program.
When Maintenance is complete, select `PRE-PURGE` cycles again on Main Menu

BEGIN PROCESS LINE THROUGH PURGE AT THIS TIME!

Low pressure side of panel and process line are under vacuum.

High pressure side of panel is under nitrogen purge gas pressure

When this cycle is complete:

A user-defined number of times (10 is minimum),

Venturi vacuum cycles are alternated with `Purge Vacuum Pressurization` cycles for

The system goes into a deep purge cycle `POST PURGE`.

The panel and process line are now roughly evacuated ONLY!

During this entire evacuation, pressure transducer P1 was monitored for vacuum > -5 psig.

Then, the panel high pressure side is evacuated for 15 seconds

This vacuum step lasts for 60 seconds.

The Venturi Vacuum comes on and evacuates the panel low pressure side and process line.

Minutes is minimum)

After entire panel is evacuated, Pressure Decay Test at P1 occurs for a user-defined amount of time (5)

The system will begin the Pre-purge cycle.

"Open MV9"
Process Cylinder Pressure Transducer

This transducer measures the process cylinder pressure. It is also used to check pressures during purge cycles.

Process Cylinder Valve

This transducer measures the process cylinder pressure at the cylinder outlet. It is also used to check pressures during purge cycles.

Purge Gas Inlet Isolation Valve (on Pigtail)

This transducer measures the pressure of the purge gas on the outlet side of the purge gas cylinder.

Purge Delivery Pressure Transducer

This transducer measures the pressure of the purge gas at the cylinder outlet.

Purge Gas Outlet Isolation Valve

This transducer measures the process gas pressure on the outlet side of the process gas manifold from the process gas cylinder and provides a low flow warning. This transducer also provides the process gas cylinder valve during process gas charging.

This transducer measures the process gas pressure at the cylinder outlet. It is also used to check pressures during purge cycles.

Vacuum Venturi Supply Valve

This transducer measures the vacuum venturi supply valve pressure. How to create a vacuum to evacuate the process缸 is also included.

Vacuum Pressure Valve

This transducer measures the vacuum pressure at the venturi supply valve. How to turn the vacuum pressure on the panel to vent.

Low Pressure Valve

This transducer measures the low pressure of the manifold from the panel to vent.

High Pressure Valve

This transducer measures the high pressure of the manifold from the panel to vent.

Components and piping

Purge Gas Inlet Valve (on Pigtail)

This transducer measures the manual valve from the purge gas cylinder.

Low Pressure Process Isolation Valve

This transducer measures the manual valve from the cylinder process piping.

High Pressure Process Isolation Valve

This transducer measures the manual valve from the process gas cylinder and pigtail.

Emergency Shutdown Valve (on Pigtail)

This section will describe the system components.

Panel Component Descriptions
This regulator controls the purge gas pressure.

Purge Gas Pressure Regulator

This regulator controls the pressure of the purge gas to the process equipment.

Process Gas Pressure Regulator

Process Panel

This manual valve isolates the high pressure vent from the high pressure side of the vent isolation valve.

Vent Isolation Valve

Pressure Process Supply. It is used to isolate the cabinet from the process line.

Process Isolation Valve

Process Line Isolation Valve

This manual valve isolates the process line and downstream equipment from the low vacuum.

Vacuum

This transducer measures the vacuum pressure in the vent piping created by the vacuum.

Vacuum Pressure Transducer

PT5

PCY-1

PCY-2

MV-9

MV-22