

Update: 20160101

# Glovebox Installation Guide

**Please Read Carefully Before Doing Installation**

Vigor Tech USA.

# **Step 1: Prepare for Installation**

# Tool Requirements

- 2 Gas Regulators
- Adjustable Wrenches
- #13 and #14 Wrenches
- Teflon Tape
- 1 Person Installation
- Vacuum Pump Oil (Edward Ultragrade 19) (Optional)



Working Gas Regulator



Regeneration Gas Regulator

# Gas Requirements

- *Working gas:*
  - Type: N<sub>2</sub>, Ar, or He 99.999%
  - Quantity: 2 cylinders for a single station glovebox; 3 cylinders for each 2-3 station glovebox; 5 cylinders for a 4 station glovebox
  - Regulator: CGA350, two stages with a minimum ~80 psi (~5 bar) delivery pressure
  - Connections: Vigor provides 8mm Nylon tubing (length 3m), compression fittings, and two adapters (8mm compression to ¼” NPT female or to M16x1.5 female)
- *Regeneration gas:*
  - Type: **5-10% H<sub>2</sub> mixed with the working gas**
  - Quantity: One cylinder for each glovebox
  - Regulator: CGA 580, two stages with ~40 psi (~3 bar) delivery pressure range (Note: 5% H<sub>2</sub> in N<sub>2</sub>, Ar or He is non-flammable,
  - Connections: Vigor provides 8mm Nylon tubing (length 3m), compression fittings, and two adapters (8mm compression to ¼” NPT female or to M16x1.5 female)

# Other Requirements

- *Vent:*
  - Vigor supplies the following tubing:
    - ID16mm X 10m: for the vacuum pump exhaust
    - ID32mm X 10m: for the box purge vent
    - OD8mm X 3 m: for the regeneration exhaust gas
  - All of the vent lines should connect to an exhaust system or should vent outside of the facility to avoid inhalation of any toxic fumes which may be generated while using the box.
- *Electrical Power:*
  - Single phase, 220V/50 - 60Hz (10 A) or single phase 110V/60 Hz (15A)
  - Each glovebox should plug into a dedicated outlet. Other equipment, such as balances, hotplates, or extra vacuum pumps, used inside or outside of the glovebox, require additional outlets.

# Important Warnings!

- Never install O<sub>2</sub> and H<sub>2</sub>O analyzers on a new glovebox before it is fully purged (until Step 4).
- Do not unpack the **electrochemical cell** for the oxygen analyzer if it's not ready to be installed immediately (until Step 4). **Long exposure to air will shorten the life or even damage the cell.**

# **Step 2: Connecting the Components**

**When Moving or Lifting the Glovebox,  
Please DO NOT Push or Pull on the  
External Components or Plumbing.**



**If excessive force is exerted on the external components during moving, it may damage the fittings, valves or tubing and cause serious leakage problems.**



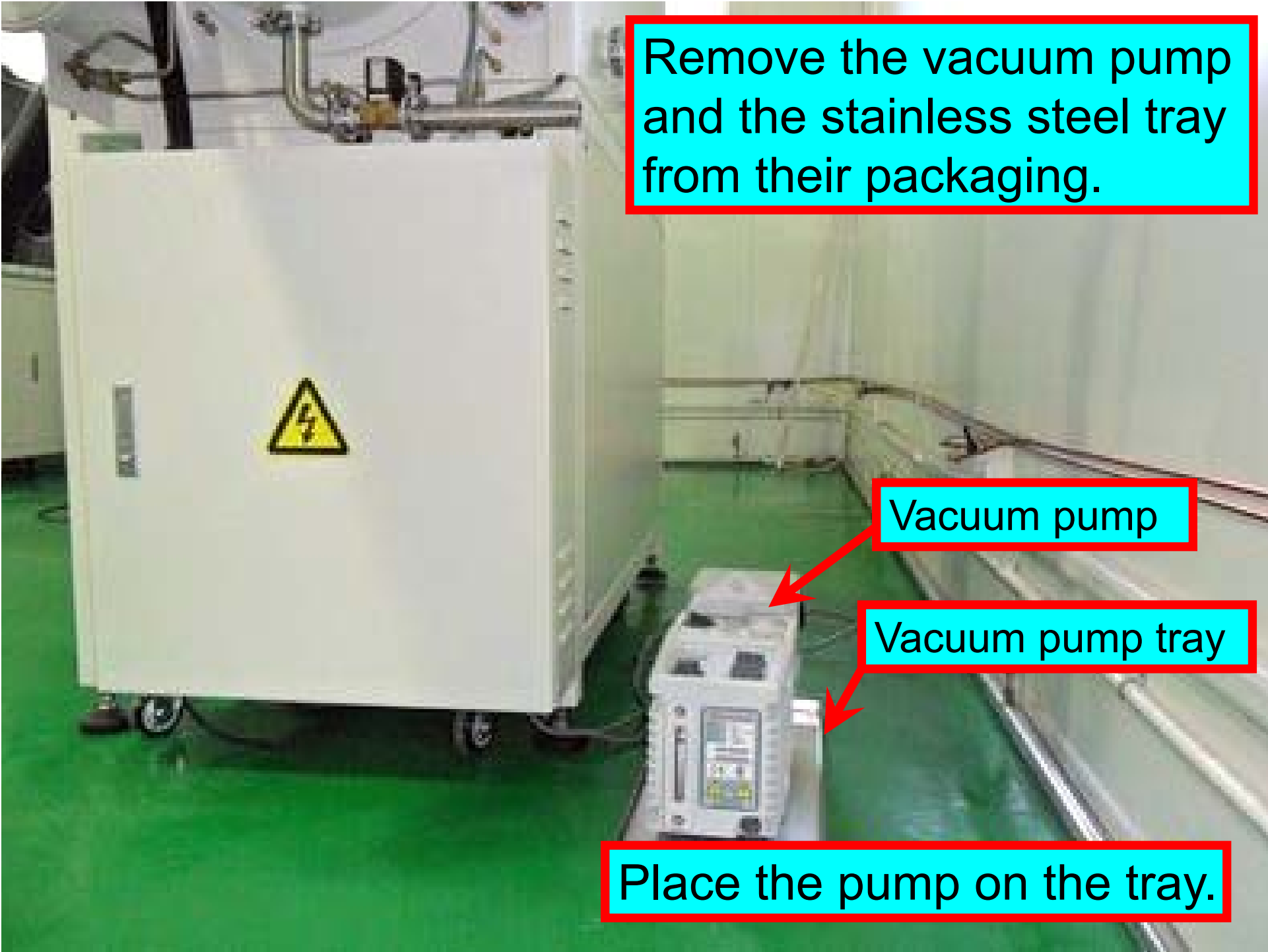
Move the glovebox to its intended location, then remove the protective plastic wrapping.



**Warning:** Even at low speeds, the heavy glovebox generates a large amount of momentum. This energy can easily damage the box through collisions with walls or door frames. Special care should be taken to prevent glove ports from bumping into anything.



Adjust the levelers to lift and level the glovebox. All of the casters should be off the ground.

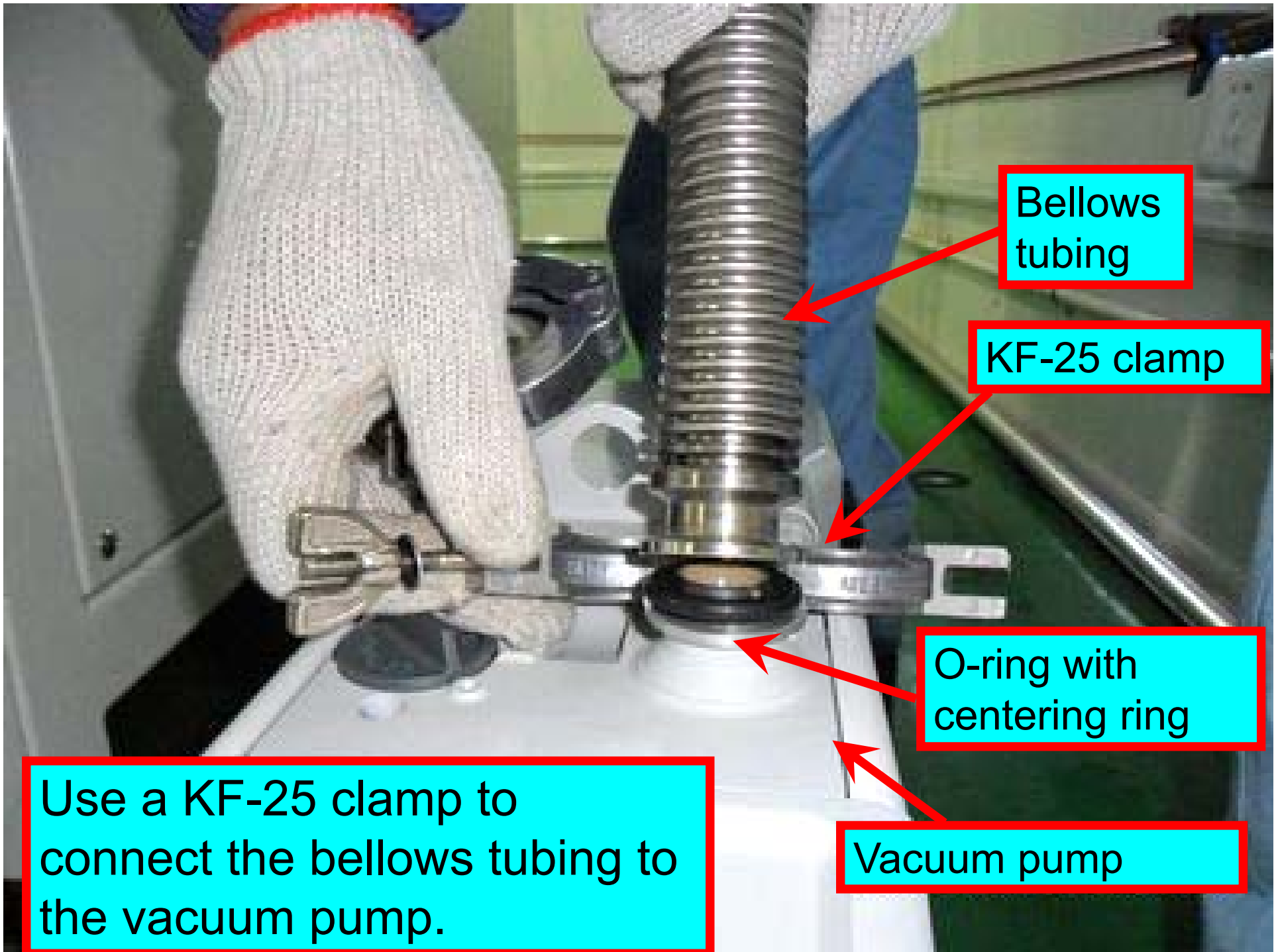


Remove the vacuum pump and the stainless steel tray from their packaging.

Vacuum pump

Vacuum pump tray

Place the pump on the tray.



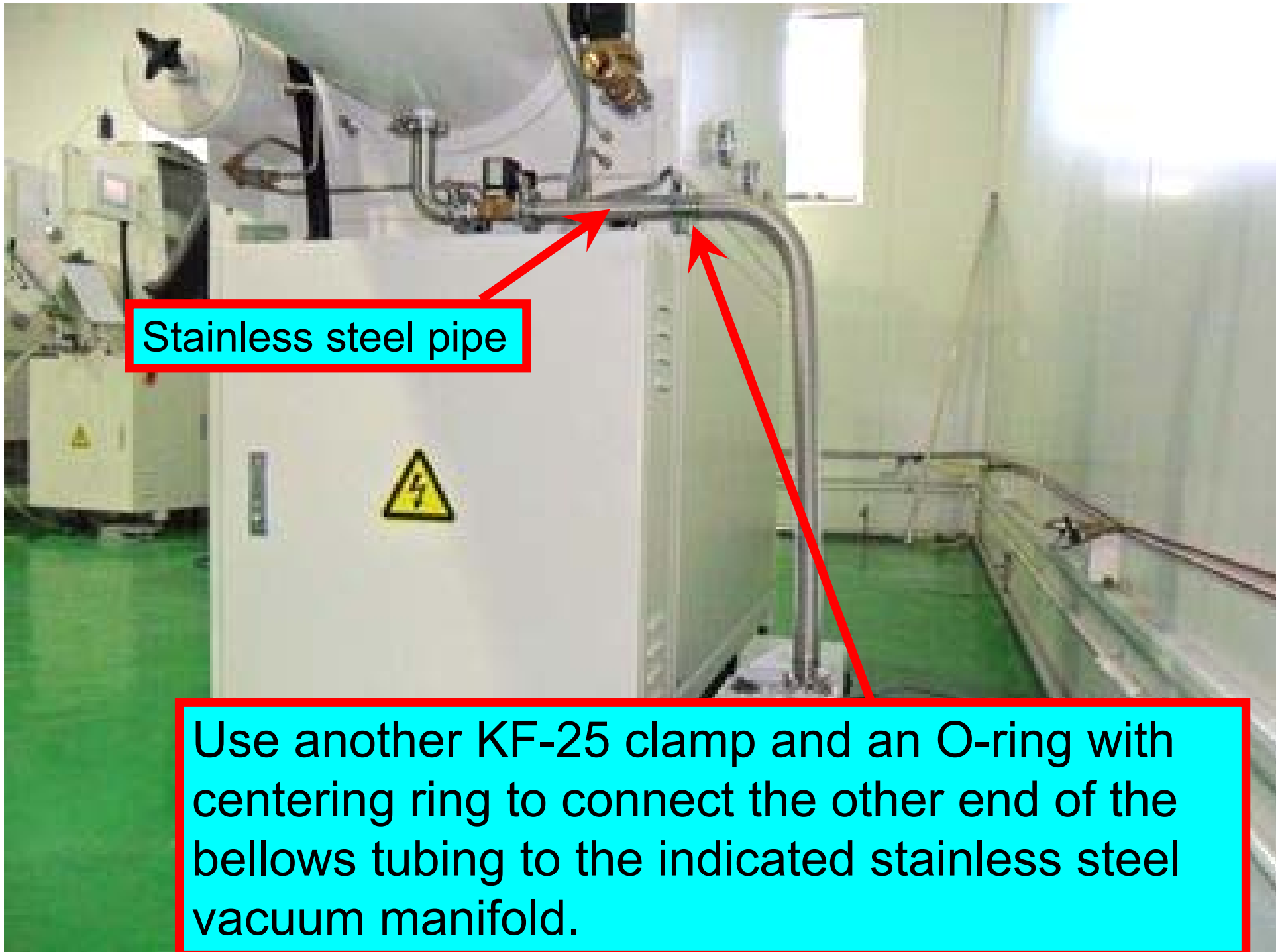
Bellows tubing

KF-25 clamp

O-ring with centering ring

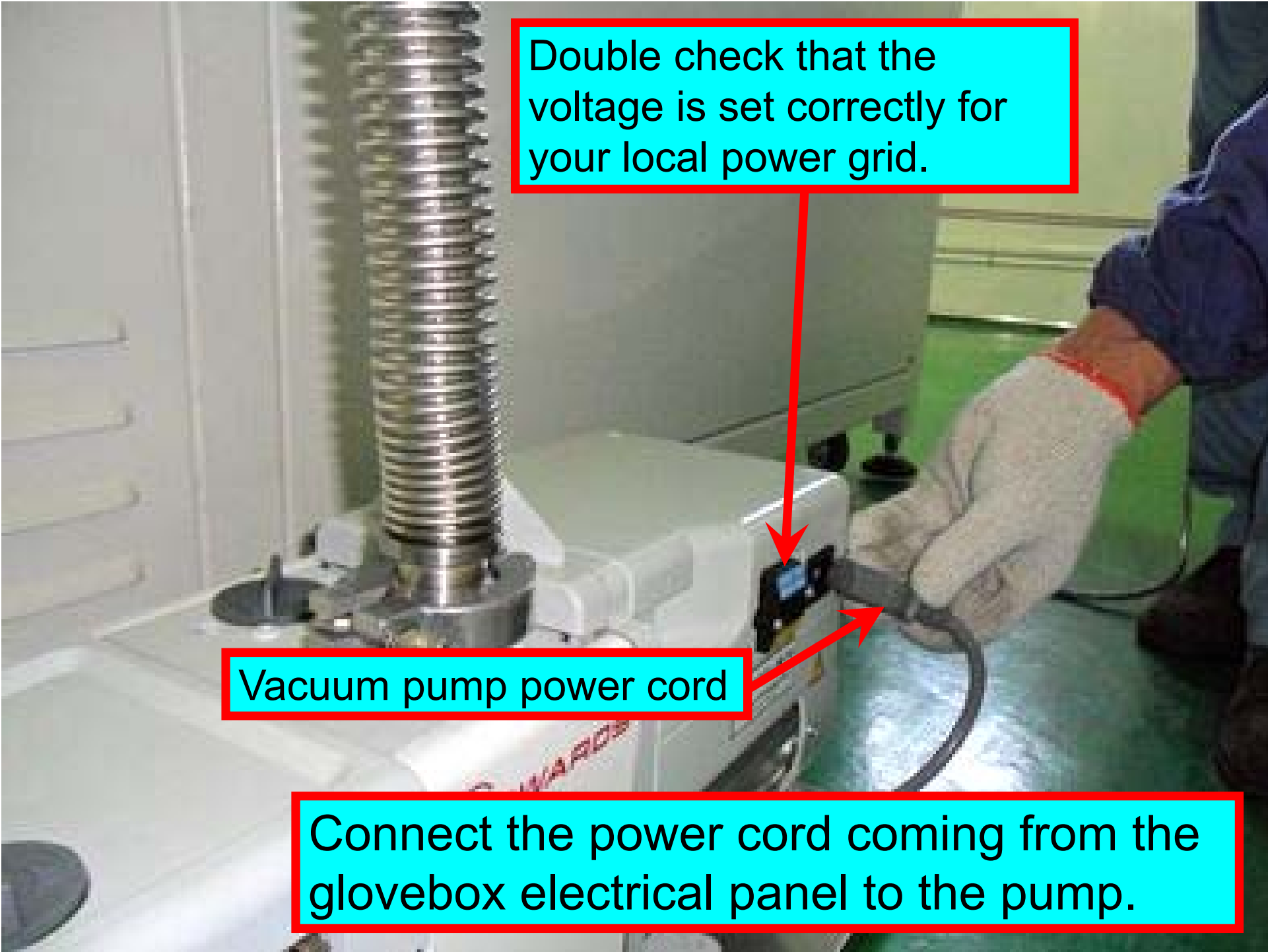
Vacuum pump

Use a KF-25 clamp to connect the bellows tubing to the vacuum pump.



Stainless steel pipe

Use another KF-25 clamp and an O-ring with centering ring to connect the other end of the bellows tubing to the indicated stainless steel vacuum manifold.

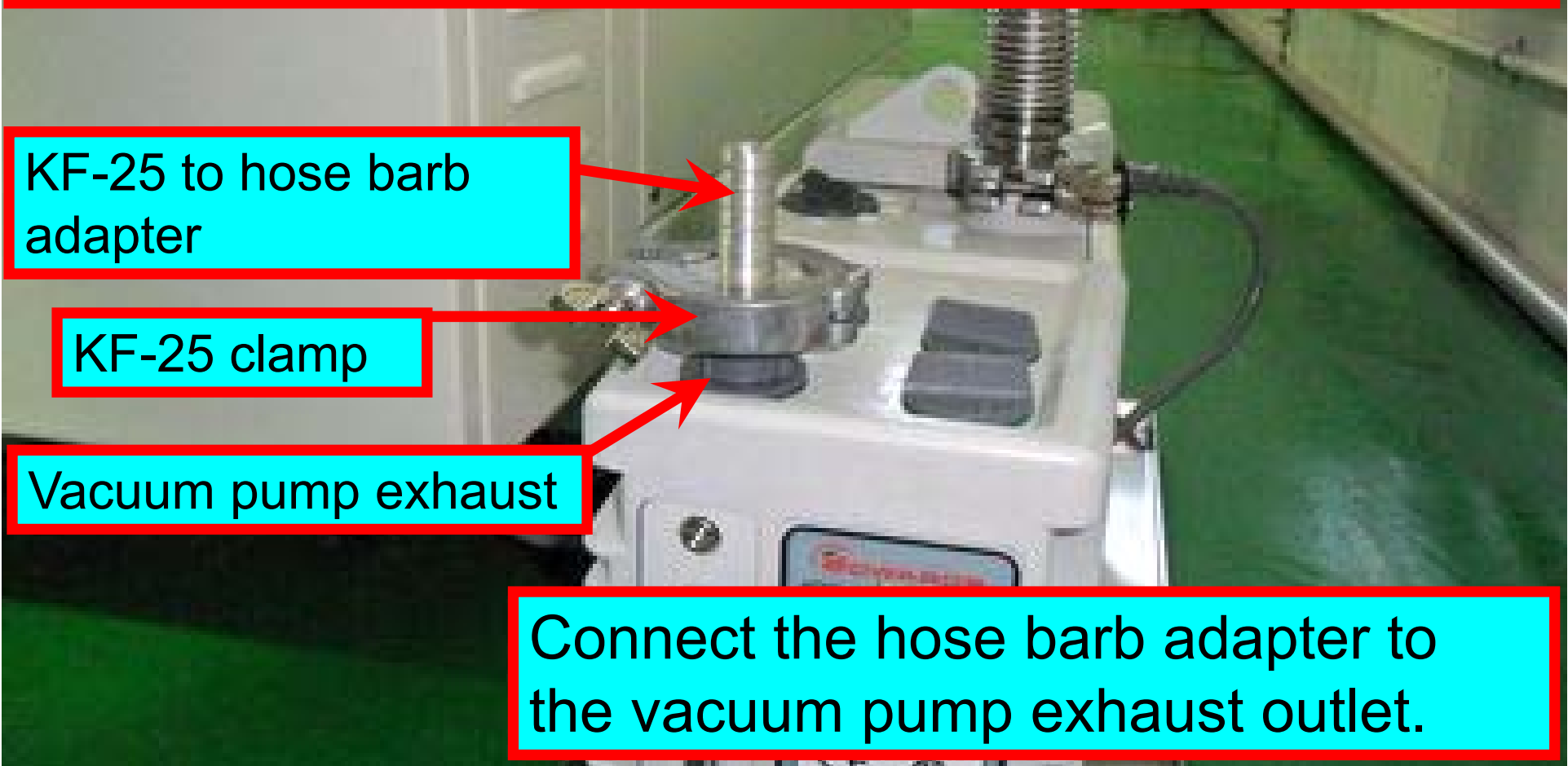


Double check that the voltage is set correctly for your local power grid.

Vacuum pump power cord

Connect the power cord coming from the glovebox electrical panel to the pump.

**Warning:** Exhaust from vacuum pump may contain toxic chemical vapors. Connect the exhaust outlet to a fume hood system or vent it outside of the building. We strongly recommend avoiding the practice of installing an oil-mist filter and venting the exhaust gas to the room because the filter will only remove oil mist, not toxic chemical vapors.



KF-25 to hose barb adapter

KF-25 clamp

Vacuum pump exhaust

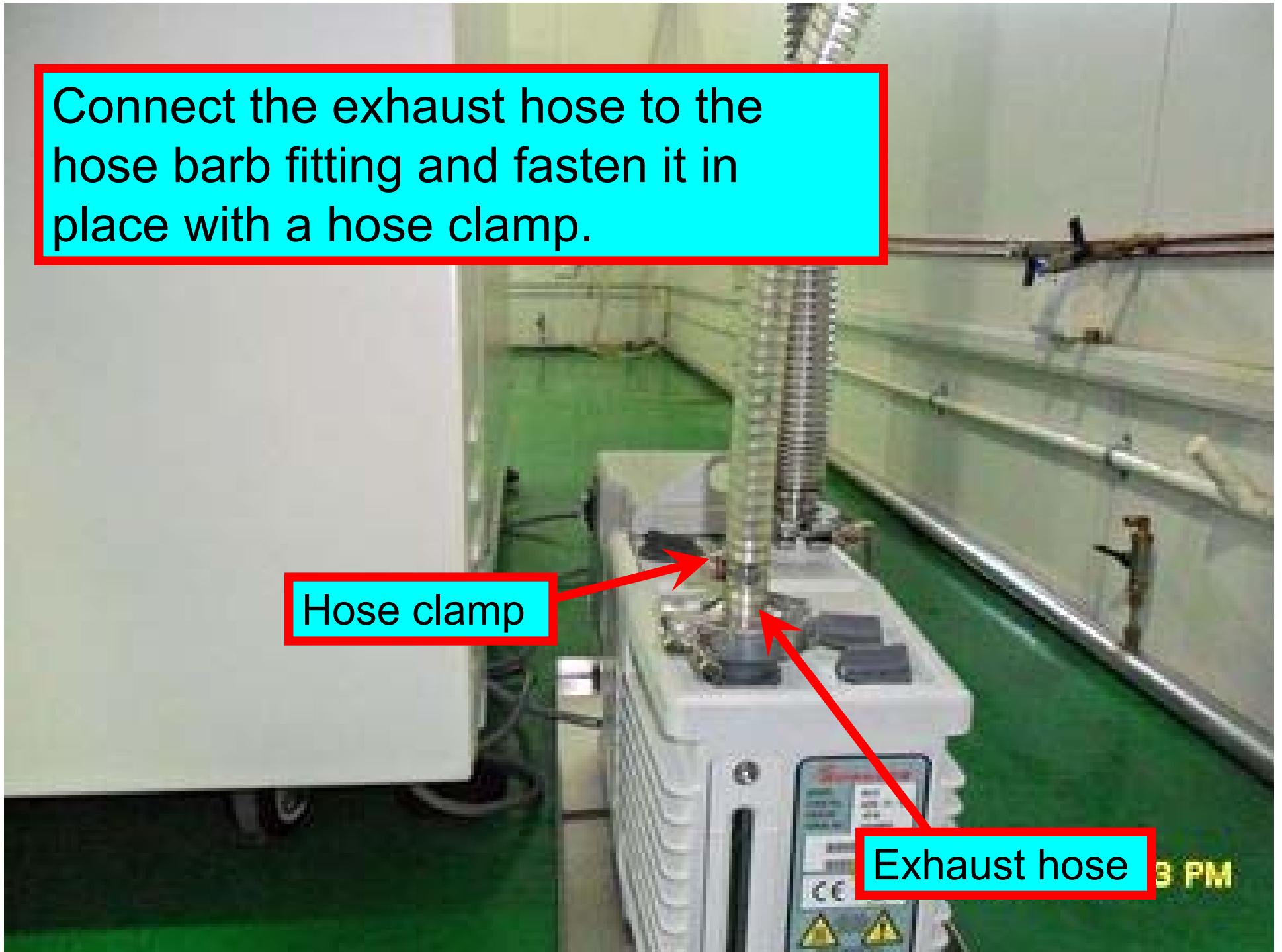
Connect the hose barb adapter to the vacuum pump exhaust outlet.

Connect the exhaust hose to the hose barb fitting and fasten it in place with a hose clamp.

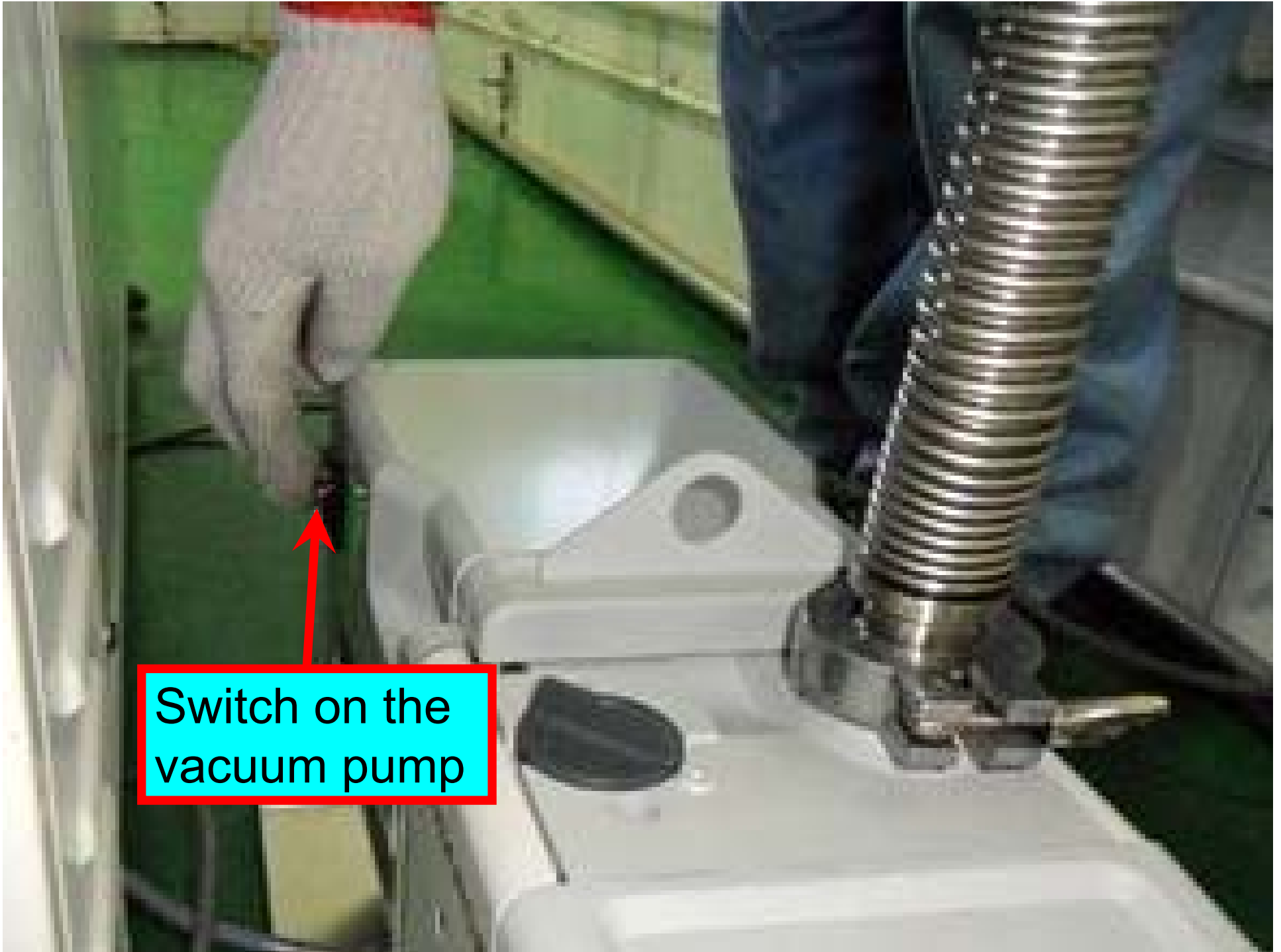
Hose clamp

Exhaust hose

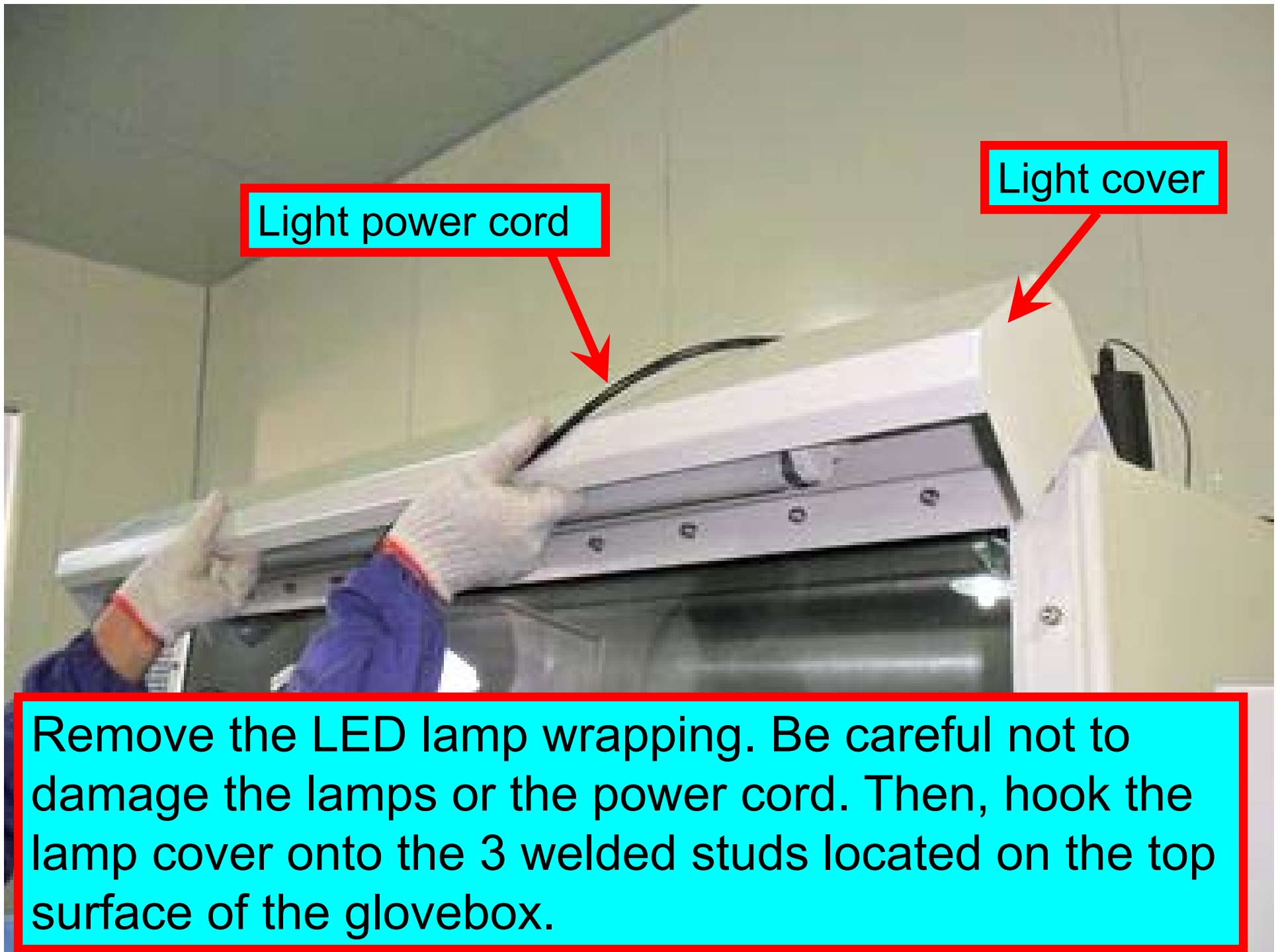
3 PM







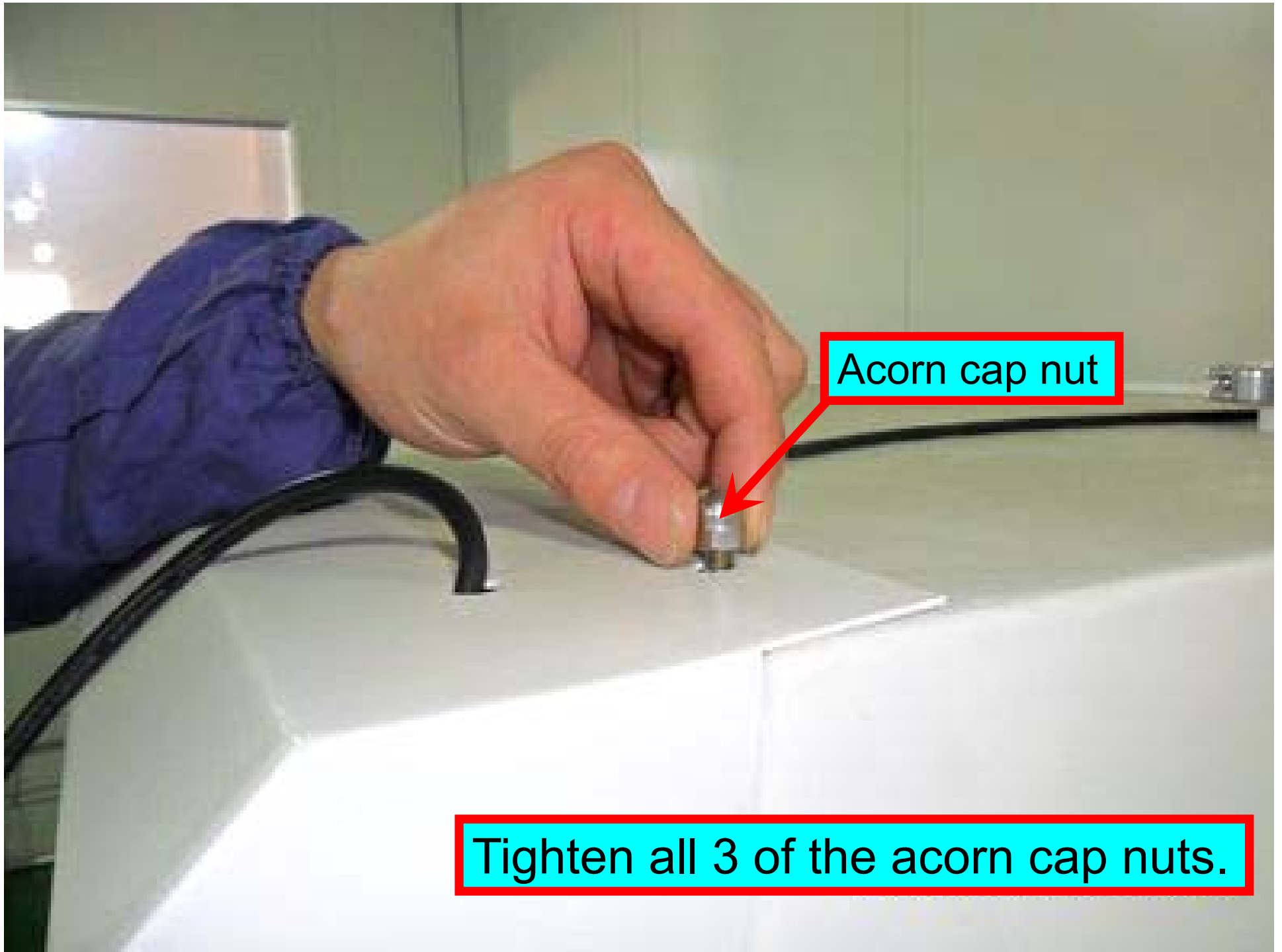
Switch on the  
vacuum pump



Light power cord

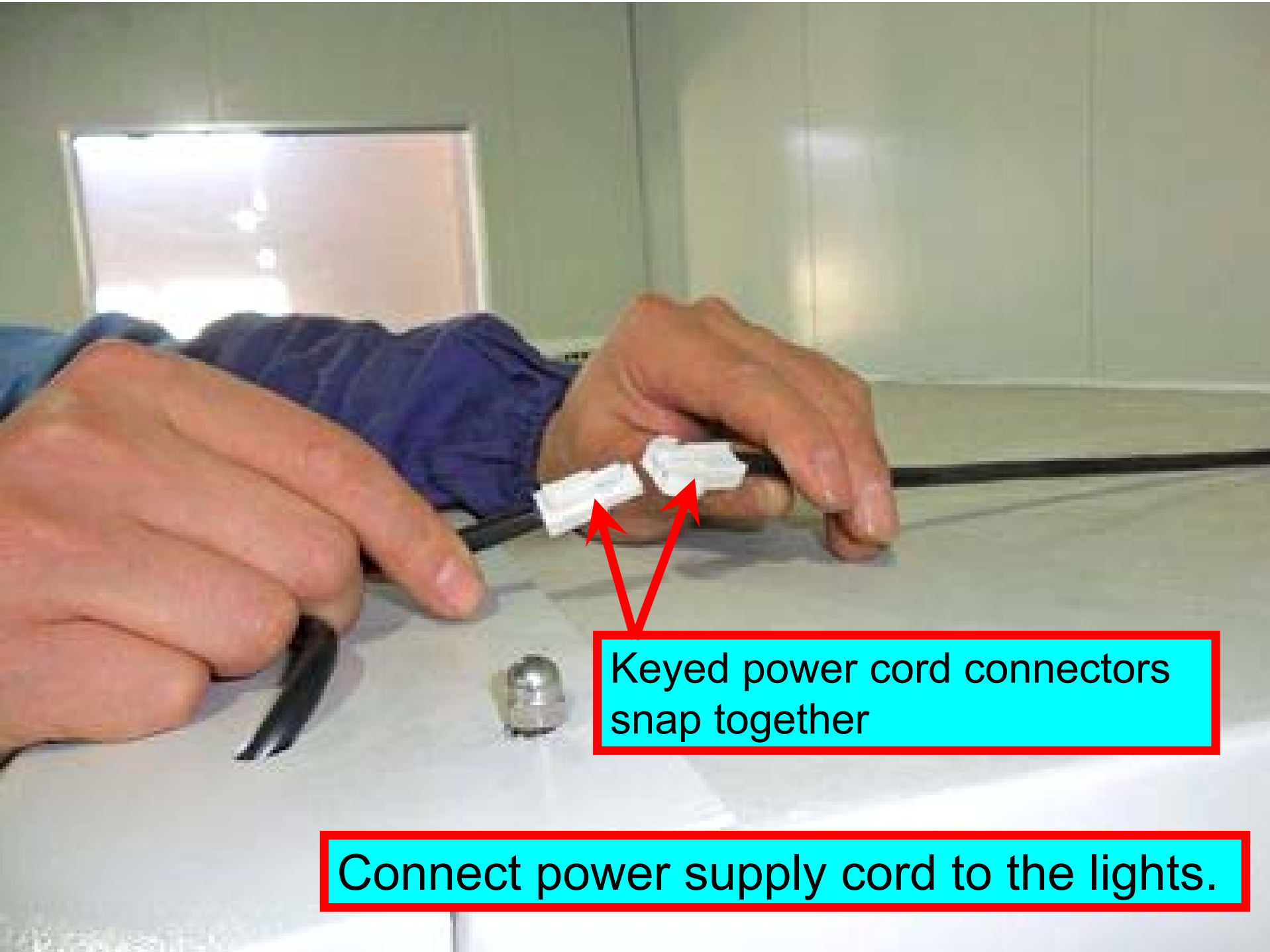
Light cover

Remove the LED lamp wrapping. Be careful not to damage the lamps or the power cord. Then, hook the lamp cover onto the 3 welded studs located on the top surface of the glovebox.



Acorn cap nut

Tighten all 3 of the acorn cap nuts.



Keyed power cord connectors  
snap together

Connect power supply cord to the lights.



Regulator requirement:

1. Two stage, 10 bar delivery pressure capability.
2. Connection: preferably 8 mm compression fitting so that the 8 mm tubing supplied by Vigor can be directly connected to the regulator.

Connect the regulator to the working gas cylinder.

If the fitting is not an 8 mm compression type, 8mm tubing cannot be connected to the regulator. Please find the following adapters in the tool box supplied by Vigor.

1. 1/4" NPT female to 8mm compression fitting
2. M16x1.5mm female to 8mm compression fitting

Install the appropriate adapter onto the existing threads of your regulator.

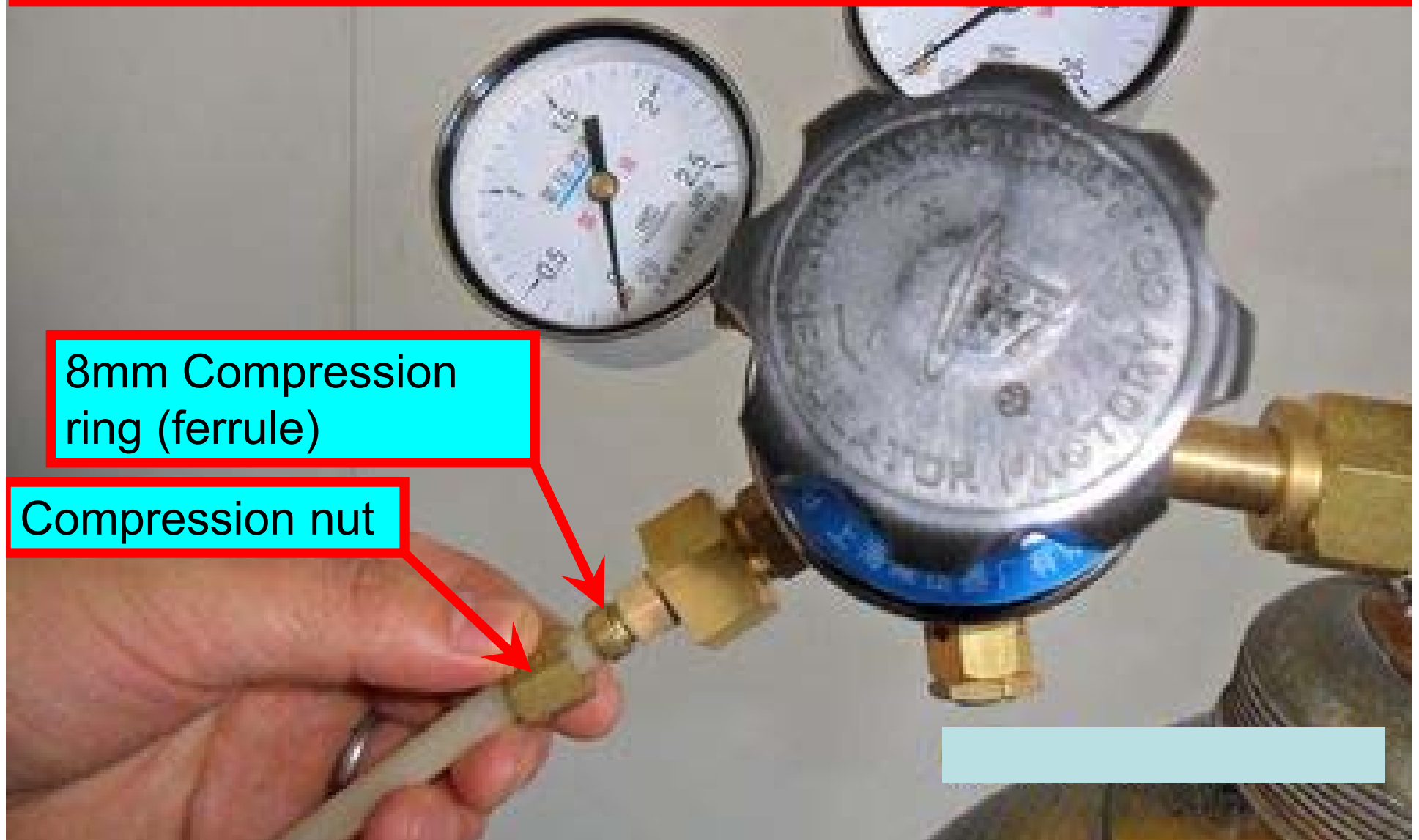


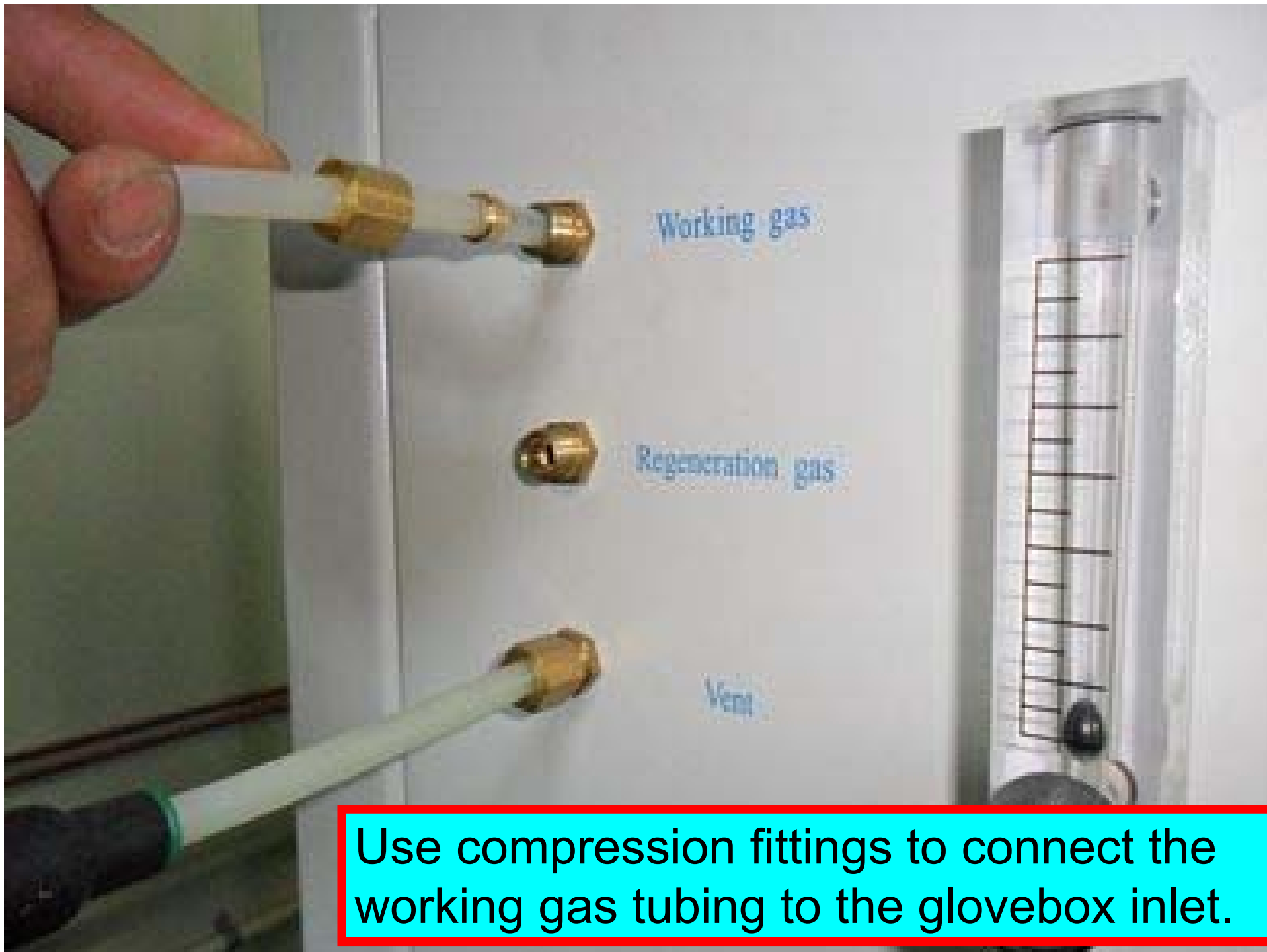
Before tightening the metal fittings, please apply Teflon tape.



1/4" NPT Adapter

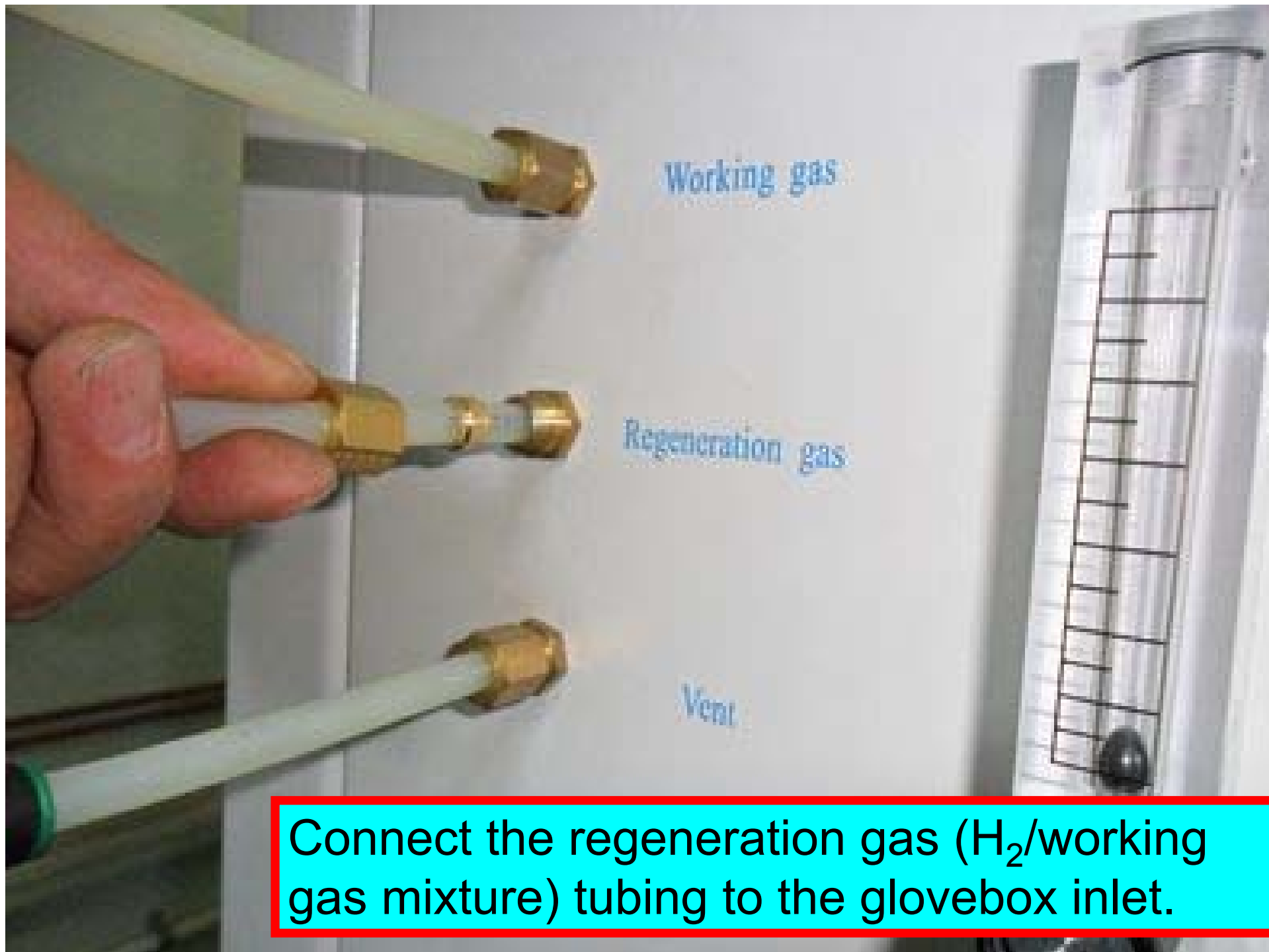
Find the nuts/ferrules in the tool box and slide a compression nut, followed by a ferrule, over the end of the Nylon tubing provided by Vigor. Push the tubing against the seat of the adapter and screw the nut onto the adapter. Tighten the nut using two wrenches, with one serving as a hold back.





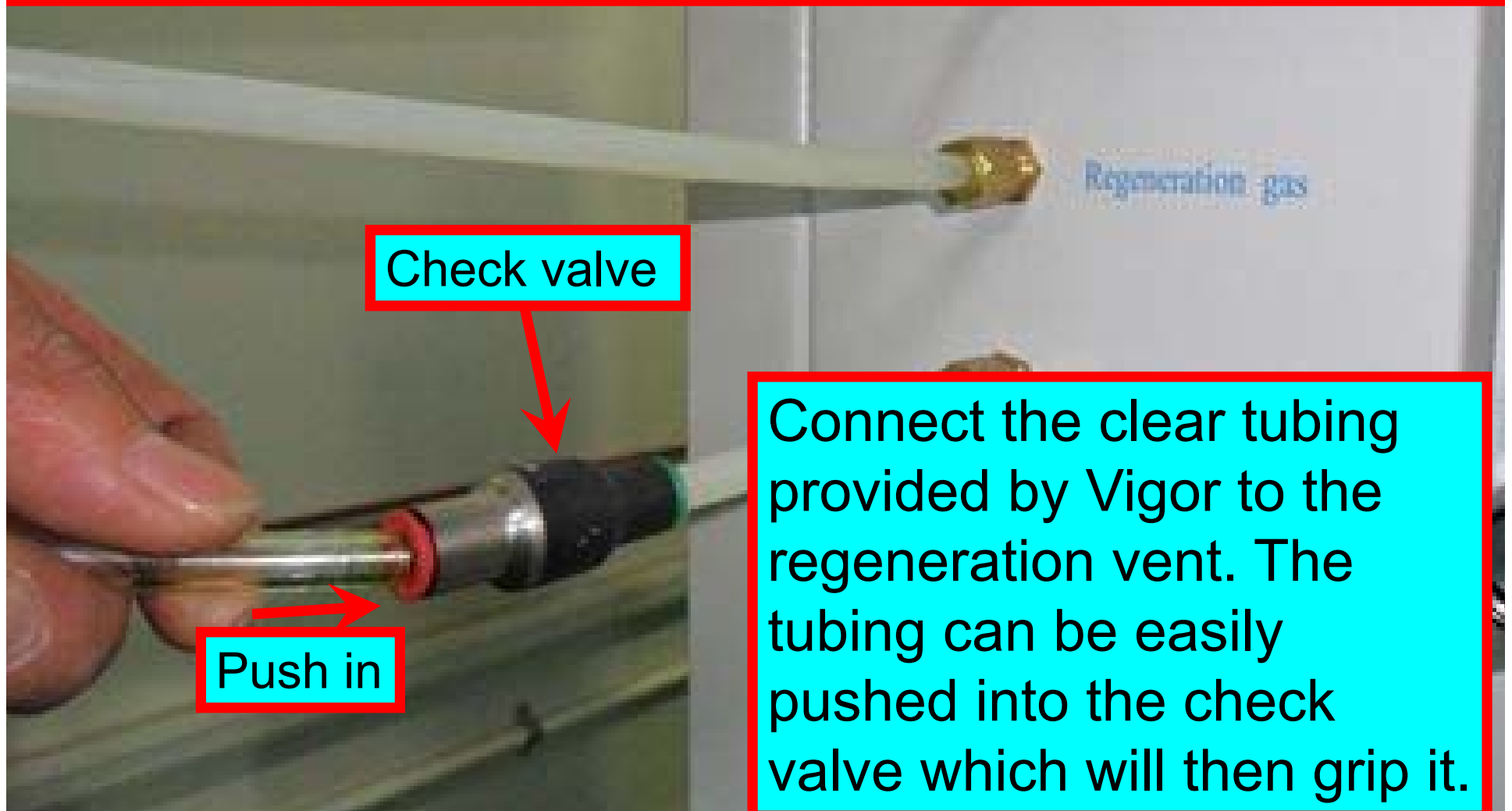
Use compression fittings to connect the working gas tubing to the glovebox inlet.





Connect the regeneration gas ( $H_2$ /working gas mixture) tubing to the glovebox inlet.

**Warning:** Regeneration exhaust may contain toxic vapors and unreacted hydrogen. Connect the regeneration vent to an exhaust system (such as a fume hood) or vent it outside of the building.



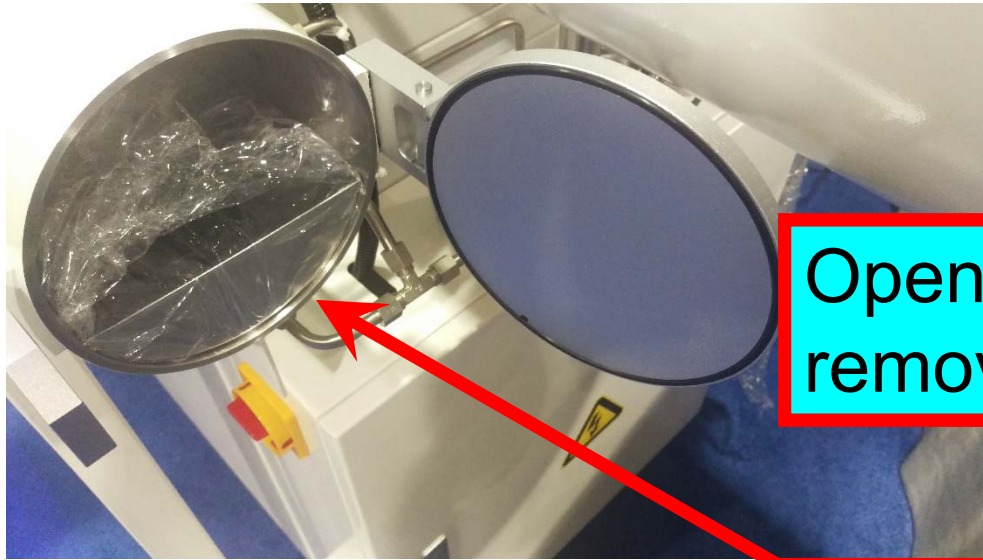
**Warning:** Connect the purge exhaust to a fume hood system or outside of building to avoid inhaling any toxic vapor from the box.

Exhaust pipe. Immerse the end in hot water to soften it for easy installation.

Purge valve



Connect the 1-1/4" tubing (provided by Vigor) to the purge valve outlet and secure it with a hose clamp.



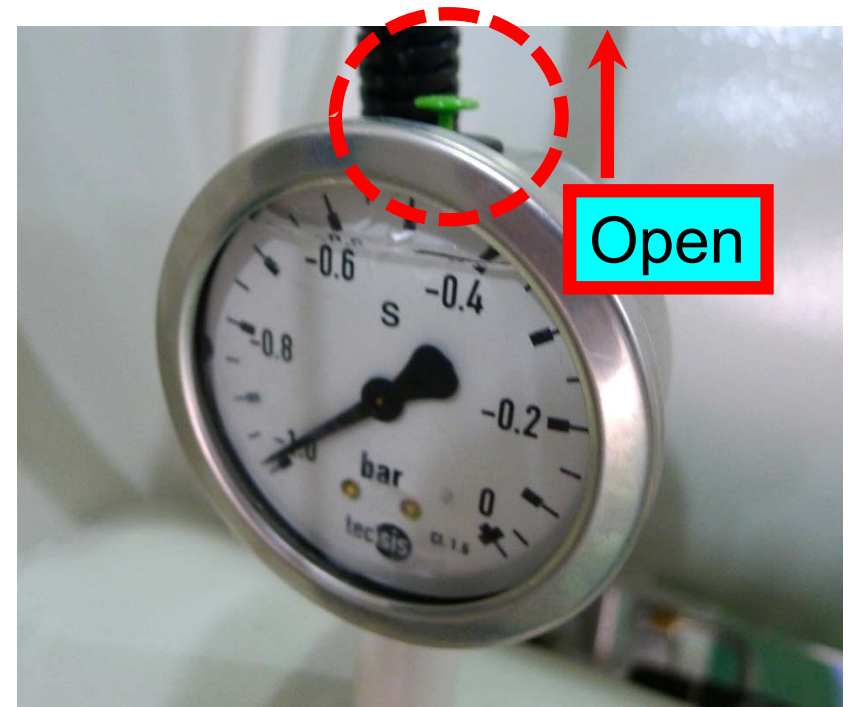
Open small antechamber door,  
remove tray and unwrap it.

Antechamber trays  
with wrapping



Remove large antechamber  
tray wrapping

Open the valve at the top of each antechamber pressure gauge.





Install the gloves with the thumb up and turn the cuff inside out and over the gloveport. Rotate the cuff of the glove to further adjust the position of the thumb if needed.



There are three grooves on the glove port. Adjust the glove cuff so that the rim of the glove is positioned in the first groove from the window. Place two O-rings over the gloves and into the other two grooves.

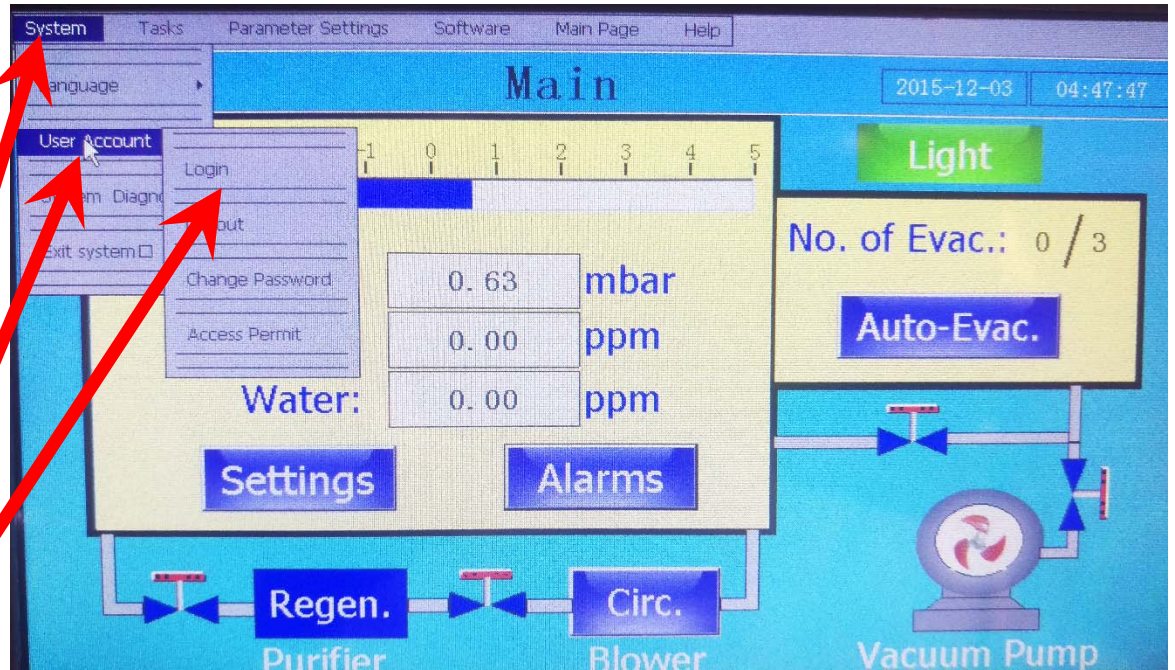
# **Step 3: Test the Air Tightness of the Glovebox**

Every time power on the glovebox, please do user Log-in

1. System

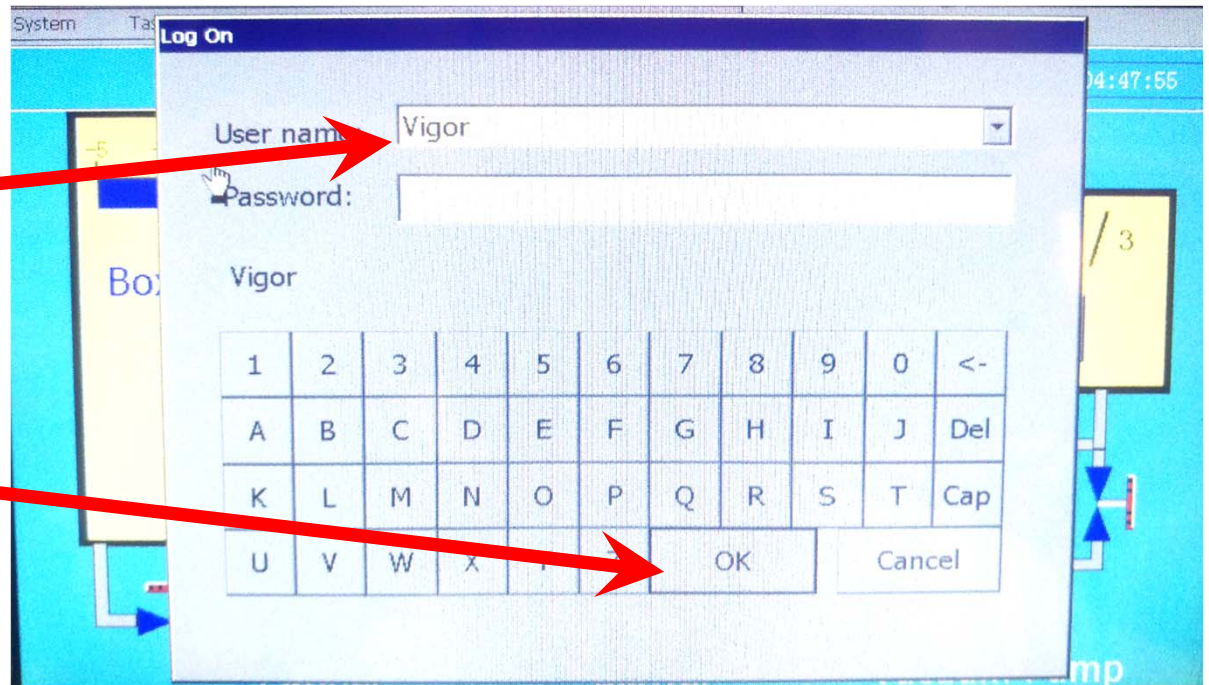
2. User Account

3. Login



4. Vigor,  
no passwords

5. OK



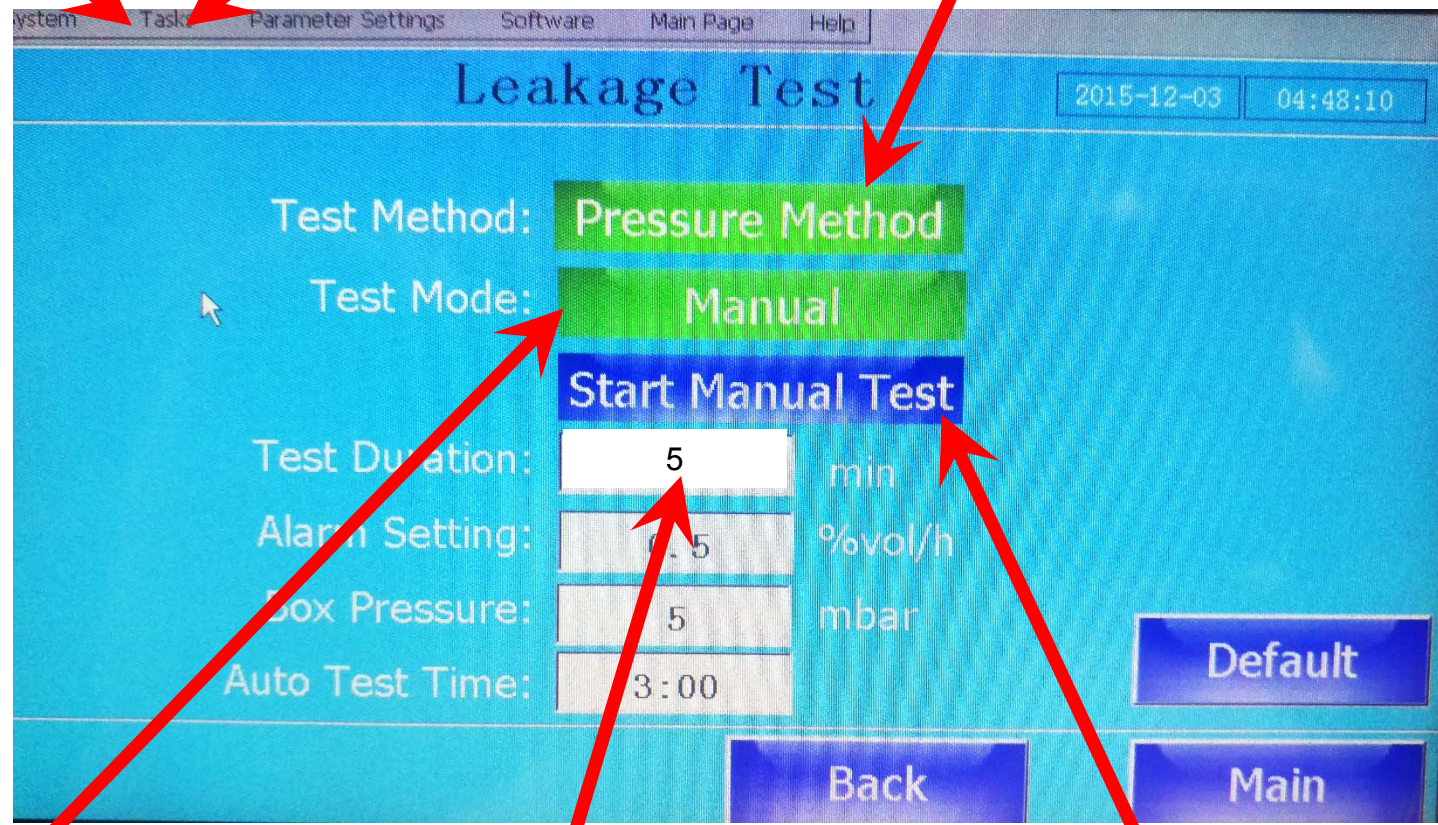


Adjust the working gas regulator pressure to 80 psi.

1. Task

2. Leakage Test

3. Pressure Method



4. Manual

5. Test Duration: 5 min

6. Start Manual Test

Wait for **5** minutes for glovebox pressure to stabilize and **DO NOT** touch the gloves during the test

System Tasks Parameter Settings Software Main Page Help

## System Settings

2013-11-14 14:47:33

Box Pressure	High:	<input type="text" value="0"/>	mbar	Default
	Low:	<input type="text" value="0"/>	mbar	
Alarm Settings	O2 Setting:	<input type="text" value="0"/>	ppm	Default
	H2O Setting:	<input type="text" value="0"/>	ppm	
Leakage rate		<input type="text" value="0"/>	%vol/h	Main

The glovebox should be automatically refilled and tested for about 15 minutes.

Leakage rate  $<0.5\%Vol/h$   
Perfect!

Go to next step

Leakage rate  $>0.5\%Vol/h$   
Oops! Leaking

Please check all of the tubes and valve connections. Contact Vigor Customer Service if you need help locating a leak.

# Step 4: Purge and Install the Analyzers

(If user purchased analyzers)

Adjust the working gas regulator pressure to **45** psi.

System Settings

2013-11-14 14:47:33

Box Pressure

High:  mbar

Low:  mbar

Default

Alarm Settings

O2 Setting:  ppm

H2O Setting:  ppm

Default

Leakage rate

%vol/h

Main

Set the box pressure lower limit to at least 5 mbar and then go to the Purge page.

**Warning:** Do not install analyzers before the box is fully purged.

Purge Settings

2013-11-14 14:45:58

Start Purge

Purging Time : 30 min

Box Pressure: 0.00 mbar

Oxygen: 0.00 ppm

Water: 0.00 ppm

Main

The amount of gas needed for the purge: Single-length box (1 cylinder), double length box (2 cylinders). Set purge time to a few hours so it doesn't stop prematurely.

# Xentaur Moisture Analyzer



**Warning:** Do not apply excessive force to the electronics compartment during installation or you may break it.



flange



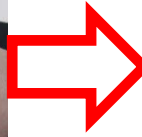
Electronics  
compartment  
(Analyser)



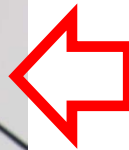
cap



Remove the black cap and **gently** screw the flange onto the transmitter.



It will be further tightened with a wrench after the assembly is installed onto the glovebox KF-40 fitting.



H<sub>2</sub>O transmitter installation steps:

1. Set lower box pressure limit to +5 mbar.
2. Open the KF-40 clamp.
3. Remove the blanking cap.
4. Quickly put the analyzer flange in its place.
5. Tighten the KF-40 clamp.

Connect the signal cable to the moisture transmitter. Turn the knurled ring clockwise to tighten it.



No need to push any buttons to activate the analyzer

# GE Oxy IQ Oxygen Analyzer

Please unpack the Oxy IQ O2 analyzer.

**Warning:** Do not touch the membrane of the sensor

Power cable from the glovebox

Oxy IQ transmitter

OX-1 sensor cell

KF-40/KF-25 adapter





Set the box pressure lower limit to +5 mbar. Remove the blank cap, and install the KF-40/KF-25 adapter.



Tighten the KF-40 clamp to firmly secure the adapter.



Connect the power cable to the rear of the transmitter.



After connecting the power, a display will appear on the LCD screen.



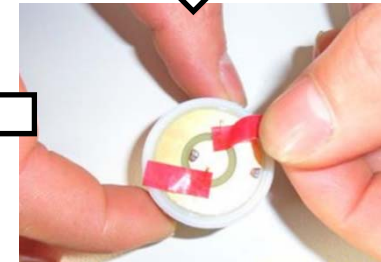
The measured oxygen level should now display on the LCD screen.



Attach the transmitter to the adapter and firmly tighten.









Orient the sensor so that its gold-plated electrodes are facing the spring-loaded contact pins of the transmitter base. Firmly press the analyzer into the base.




Open the sealed bag containing the OX1 sensor cell and remove the red tape tabs.



To select the desired measurement range, complete the following steps:

1. Press the  **Enter** key to enter the *Main Menu*.
2. Press the  key twice and then press the  **Enter** key to enter the *Output* menu.
3. Press the  **Enter** key to select the *Range* menu option.
4. Use the  and  keys to scroll through the available options, as listed in *Table 2* below.

**Table 2: Available Output Ranges**

Units	Span Value
% O <sub>2</sub>	1, 2, 5, 10, 21, 25, 50, 100
ppm O <sub>2</sub>	10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000

 **Please select 100 ppm (glovebox default value)**

5. After selecting the desired output range, press the  **Enter** key to save the selection. Then, press the  **Cancel** key to return to the *Output* menu.

# Step 5: Circulation

Please Stop The Purge Before Starting The Circulation Process

- Adjust the working gas delivery pressure to **80 psi**.
- The default setting for the circulation mode is “**On Demand**”. Newly installed analyzers always give high readings which will trigger the start of circulation.
- For a new box, we recommend setting the circulation mode to “**Manual**”, and to run the box continuously for at least **one week**, or setting it to “On Demand” mode with the upper limits for O<sub>2</sub> and H<sub>2</sub>O set to 1 PPM and the lower limits for O<sub>2</sub> and H<sub>2</sub>O to 0.2 ppm.



# Circulation

The default mode is “**On Demand**”. After powering-on, press this button to change to “**Manual**” mode

In “**Manual**” mode, press this button to start or stop circulation

In “**On Demand**” mode the upper limit is used to start circulation. Set to 1ppm for a new box

The screenshot shows a software interface titled "Purifier Circulation Settings" with a menu bar at the top containing "System", "Tasks", "Parameter Settings", "Software", "Main Page", and "Help". The date and time "2013-11-12 17:30:21" are displayed in the top right. The interface includes several controls: "Circulation Select:" with a dropdown menu showing "#1Circulation"; "Circulation Mode:" with a green button labeled "Manual"; "Start Circulation" with a purple button; "On Demand Circulation Settings:" with four input fields: "O2 High:" (value 1, unit ppm), "O2 Low:" (value 0.2, unit ppm), "H2O High:" (value 1, unit ppm), and "H2O Low:" (value 0.2, unit ppm). A "Default" button is located to the right of these settings. At the bottom, there are two buttons: "Historical Data" and "Main". Red arrows point from the text boxes to the "Manual" button, the "Start Circulation" button, the "O2 High" and "O2 Low" input fields, and the "Main" button.

Lower limit is used to stop circulation. Set to 0.2ppm for a new box

Press this button to return to main page

# Step 6: Regeneration

Please Stop all Purge and Circulation Before Going Regeneration Process

- Adjust regeneration gas regulator to 15 - 40 psi (~1 - 3 bar) and flow meter rate to 5<sup>th</sup> – 6<sup>th</sup> scale.
- Vigor suggests a new glovebox regenerates after O<sub>2</sub> and H<sub>2</sub>O levels around 5 to 10 ppm, but if circulation is unable to low down O<sub>2</sub> and H<sub>2</sub>O levels, please try to regenerate the glovebox once.
- Regeneration process usually takes about 24 hrs to complete. Vigor recommends regenerate your glovebox once per year.



# Regeneration

Temporary stop regeneration process

Start or stop regeneration process

Total regeneration running time

The screenshot shows a software interface for a 'Regeneration' process. At the top, there is a menu bar with 'System', 'Tasks', 'Parameter Settings', 'Software', 'Main Page', and 'Help'. The main title 'Regeneration' is centered, with a date '2013-11-14' and time '14:54:55' on the right. Below the title are two buttons: 'Start Regeneration' and 'Pause'. A red dashed box encloses the 'Running Time' section, which displays '0' in a box followed by 'min', and below it, 'Running Time:' followed by three boxes containing '0', separated by colons. At the bottom, there are two buttons: 'Historical Data' and 'Main'. Three red callout boxes with arrows point to the 'Start Regeneration' button, the 'Pause' button, and the 'Running Time' display.

- O<sub>2</sub> and H<sub>2</sub>O levels might increase about few ppm after regeneration.
- After regeneration, please wait for an hour to cool down purifier column and then start circulation to further remove impurities below to 1 ppm. If start circulation immediately without waiting, it will damage purifier system.