AI000228 Rev A

METHOD OF PROCEDURE (MOP)
DC HVAC Installation MOP
Part Number AF000404 & AF000405

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Revision History

Document Number: AI000228 Rev A **Prepared By**: Richard De Felice **Reviewed by: Christophe Massenet**

DATE	REV.	DESCRIPTION	AUTHOR	APPROVAL
0705/2022	A.0	Original Document	Richard De Felice	Christophe Massenet

References

Refer to the following documents to facilitate successful completion of this MOP:

REF1: DS000230 Wiring diagram AF000404 & AF000405 DC HVACs
REF2: SO000230 Installation Method of Procedure for AF000400 Controller

1 General

This document presents the installation method of procedure for the Schrofftech AF000404 & AF000405 DC HVACs. This document is preliminary and will be refined based on the first trial findings. It is to be used in conjunction with the Reference documents listed above to properly install, test and commission the products.

Observe the general safety precautions against personal injury and equipment damage at all times.

This method of procedure must be read and understood in its entirety before starting the installation and operation. If there are any questions, contact Schrofftech Technical Support (techsupport@schrofftech.com or +1 401-667-7851 x1) before starting for guidance or to arrange for training.

Completion of this method of procedure by unskilled or untrained technicians voids the warranty of the unit. A working knowledge of low voltage wiring practices as well as mechanical construction techniques is essential.
The ability to precisely cut openings in concrete walls and a variety of building types is typical of the installation process. Familiarity with tools such as circular saws, demolition saws, hammer drills, impact drivers and general-purpose construction tools is required.

Familiarity with electrical wiring, measurement tools such a digital multimeter and use of a computer, smartphone or electronic tablet is also required.

EXTREME CAUTION IS REQUIRED. AC and DC voltages are present throughout the shelter and represent a shock hazard to the installation technician. Cover battery terminals with an isolating material and do not place tools or materials on top of batteries.

Please read the following "Important Safety Precautions" before beginning any work.

Important Safety Precautions:

1. USE CARE when LIFTING or TRANSPORTING equipment.

2. TRANSPORT the UNIT UPRIGHT. Laying it down on its side may cause oil to leave the compressor and breakage or damage to other components. If unit has been transported laying down, it must be positioned upright for at least 1 hour prior to unit being powered ON.

3. TURN ELECTRICAL POWER OFF AT THE breaker or fuse box BEFORE installing or working on the equipment. LINE VOLTAGES ARE HAZARDOUS or LETHAL.

4. OBSERVE and COMPLY with ALL applicable PLUMBING, ELECTRICAL, and BUILDING CODES and ordinances.

5. SERVICE may be performed ONLY by QUALIFIED and EXPERIENCED PERSONNEL.
   - o Wear safety goggles when servicing the refrigeration circuit
   - o Beware of hot surfaces on refrigerant circuit components
   - o Beware of sharp edges on sheet metal components
   - o Use care when recovering or adding refrigerant

6. Use COMMON SENSE - BE SAFETY-CONSCIOUS

This is the safety alert symbol ⚠ . When you see this symbol on the HVAC unit and in the instruction manuals be alert to the potential for personal injury. Understand the signal words DANGER, WARNING and CAUTION. These words are used to identify levels of the seriousness of the hazard.

⚠ DANGER Failure to comply will result in death or severe personal injury and/or property damage.

⚠ WARNING Failure to comply could result in death or severe personal injury and/or property damage.

⚠ CAUTION Failure to comply could result in minor personal injury and/or property damage.

IMPORTANT Is used to point out helpful suggestions that will result in improved installation, reliability or operation.

⚠ DANGER

- **If the information in these instructions is not followed exactly, a fire may result causing property damage, personal injury or loss of life.**
- **Read all instructions carefully prior to beginning the installation. Do not begin installation if you do not understand any of the instructions.**
- **Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.**
- **Installation and service must be performed by a qualified installer or service agency in accordance with these instructions and in compliance with all codes and requirements of authorities having jurisdiction.**

INSTALLER: Affix the instructions on the inside of the building adjacent to the thermostat.

END USER: Retain these instructions for future reference.

2 System Introduction

This AF000404 & AF000405 are Air Conditioning units that must be operated with an AF000400 system controller (sold separately). The HVAC unit can be installed as a standalone system or together with the Schrofftech AF000401 Wall DAC or AF000402 Door DAC.

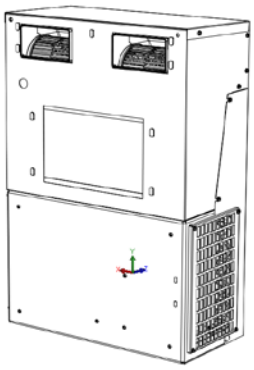
The AF000404 & AF000405 is DC powered (-48VDC) and will operate to control the shelter internal temperature. The temperature settings are pre-programmed and not meant to be changed (unless the customer requires it). If the HVAC unit is paired with a Wall DAC or a Door DAC system, it will be used to cool the upper temperature range when exterior temperatures are too high to allow for DAC use.

2.1 System components

The AF000404 & AF000405 DAC System kit includes the following items: verify that all items are present before attempting the system installation:

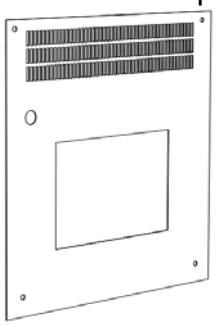
2.1.1 System components

- Qty 1. Main system unit that mounts on the wall outside to push refrigerated air into the shelter:



2.1.2 Interior Supply & Return Openings Cover:

The interior cover is to be installed over the wall openings that have been cut for the Supply and Return air and for the power & control wiring harness:

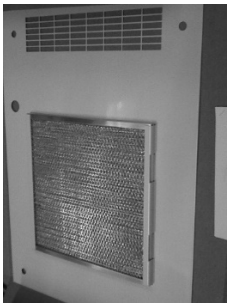


2.1.3 Hardware kit for installation:

- Self-Drill Screw (#8, 1" length, qty 5),
- Hex bolts, nuts & washers (Hex bolts 3/8 -16, 6.5" length, qty 6),
- A Special" No Ox Id (7 gram tube) + brush

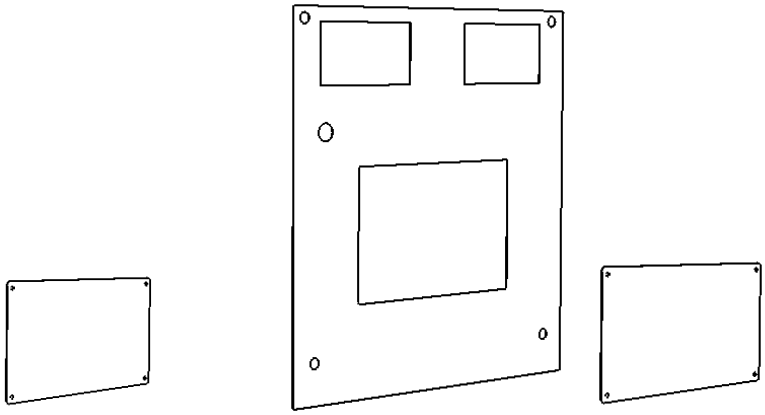
2.1.4 Washable Air filter:

Qty 1 The air filter is installed over the Return Air opening of the HVAC unit to protect the coil and reduce maintenance time.



2.1.5 Optional blanking plates kit:

Qty 3: 2 - Pebble grey powder coated metal plates to be fastened to the outside wall to plug the existing HVAC Supply opening, to re-size an existing HVAC Return opening when the existing opening is different than the footprint of the Schrofftech HVAC unit and to provide a smooth mounting surface on which to mount the HVAC unit.
Qty 1 - White FRP plate to plug the existing HVAC Supply opening.
Qty 1 - Insulation batting



2.1.6 Materials to be supplied by Installer:

- HVAC Return Grille
- 50A circuit breaker
- Construction materials & tools (see section 3.1)
- Wiring

2.2 Model & Serial Number Identification

The model identification number is found on the on the barcoded label affixed to the side of the unit:

2.3 General Operation

The HVAC unit is designed to provide climate control for an enclosure. The end user is responsible for selecting the appropriate model number and number of units based upon the specific configuration of the enclosure. The HVAC unit operates on -48VDC and will cycle to maintain the acceptable temperature range set by the profile loaded into the site controller.

2.3.1 Internal Wiring & Control Panel

The HVAC unit is not supplied with an internal controller. The unit is controlled by the AF000400 Controller (sold separately).

There is an internal electronics panel where the factory installed wiring harness is connected. The panel has relays that switch the operation of the compressor, fans and heating element.

2.3.2 Wiring Diagram

See References section for the wining diagram

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3 AF000404 & AF000405 Installation Procedure

The objective of this procedure is to describe how to install the AF000404 & AF000405 DC HVAC System.

3.1 List of Tools and Supplies

In addition to the cooling system described previously, the install crew need to have the following tools and supplies. These are for reference only, equivalent equipment and supplies per local team and customer guideline are acceptable.

Item	Purpose
Personal Protection Equipment (Gloves, Safety Glasses, Ear Plugs, Hard Hat, etc.).	General tools
Shop Vacuum and Garbage Bags	General tools
Fish tape and pulling lubricant	General tools
Reciprocating Saw	General tools
Staging (Ladders, ladder jacks, planks), 6' step ladder	General tools
Misc. Hand Tools	General tools
Standard Socket drivers and wrench sets	General tools
Level	General tools
Philips and flat Head Screw Drivers	General tools
Pliers, Diagonal Cutters, Wire Strippers	General tools
Box Cutter	General tools
Drill Index/Drivers	General tools
8" Steel cutting Saw with blades or equivalent	Enclosure cutouts for HVAC
¼ x 2" Tapcon Anchors and Diamond Bit	Special fasteners for adapter plate to wall fastening.
Caulking gun with outdoor construction adhesive and caulk	Weatherization of system wall unit.
Aluminum coil stock and associated tools.	If necessary to line wall openings if it is hollow
R10 batt insulation	If necessary to insulate abandoned wall openings
2 x 4 Handy boxes, covers	Wiring protection supplies
Wire nuts, various	Wiring protection supplies
½ and /or ¾ EMT Style Conduit, Connectors, Bushings and Clamps	Wiring protection supplies
6 AWG power wire & supplies and crimping tool	Wiring supplies
50A circuit breakers (Qty 2)	Wiring supplies
6AWG Grounding Supplies and crimping tool	Wiring supplies
18AWG T-Stat Wire or equivalent	Wiring supplies
Digital Volt Ohm Meter (DVOM)	System test and troubleshooting
Mechanical (or battery-powered) thermostat	Temporary – for testing if AF000400 controller is not available or ready

3.2 Equipment Inspection

Open the shipping box. Check all sheet metal and visible components for damage that may have occurred during transit. Please notify Schrofftech immediately if any damage is found. Remove staples and/or tape from box and fold down the sides of the box.

3.2.1 Verify that all kit components are present

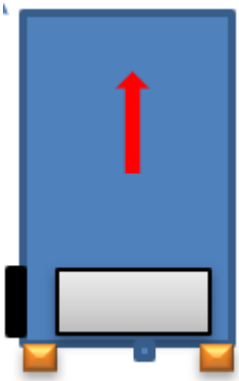
Locate the components box and remove the parts from the packaging. Contact Schrofftech if any parts are missing or damaged. Recycle packaging whenever possible.

3.2.2 Set HVAC Unit Upright

Remove the air conditioner from its box and set it upright on supports (re-use packaging for supports).

The HVAC unit must be supported at its base (packaging may be used for supports).

If the unit is placed directly on the ground, the condensate drain WILL be damaged.



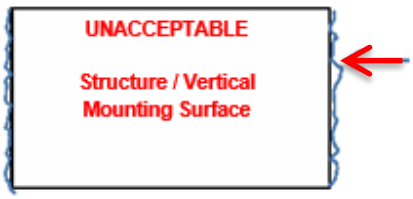
Leave the unit standing while preparing for the installation to allow refrigerant & oil to settle.

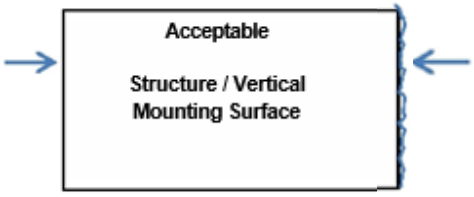
The mechanical installation of this unit only requires a few steps.

3.3 Prepare the enclosure wall

IMPORTANT

The HVAC unit is the largest component in the system, it mounts directly to the exterior wall over the wall openings. The vertical mounting surface must be clean, smooth and flat without significant texture in order for unit to properly seal to structure. The gasket on the HVAC unit is able to accommodate a moderate amount of surface texture (such as pebbled surfaces). If there is too much surface texture to permit a





proper seal, then the optional wall adapter plate will be required (see 2.1.5).

The vertical mounting surface must be able to support 110 pounds (50 Kg) and the mounting surface must be plumb to ensure proper drainage of condensation.

3.3.1 Cut wall opening

If a wall opening already exists (such as the openings from previous HVAC unit installation), the existing Return opening can be re-purposed as the Return opening for the DC HVAC unit.

If no opening exists, it must be cut with a minimum rectangular dimension of 12” (W) x 8” (H). It is recommended that the return opening be made at least 3 feet above the floor level of the enclosure or 3 feet above ground level (whichever is higher).

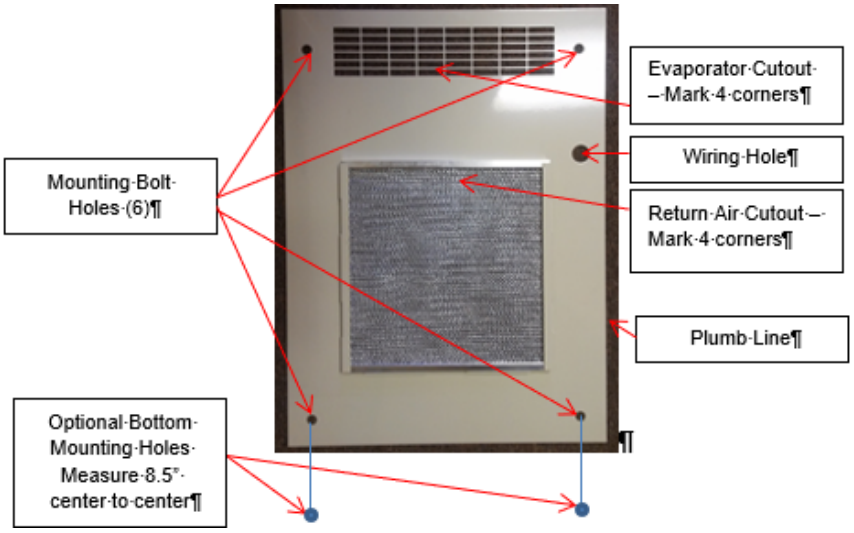
Ensure that there is sufficient clearance for the unit before starting any installation. The minimum clearance required for proper operation and to facilitate servicing is 24 inches to the nearest obstruction from the front, right and left sides of the unit. Six inches of clearance above the unit is recommended.

The dimensions of the HVAC unit are 32” (H) x 21” (W) x 13.5” (D).

Use the Interior Supply & Return Openings Cover (2.1.2) as a template to mark the locations for the mounting bolts, Supply & Return openings and cable opening on the vertical mounting surface.

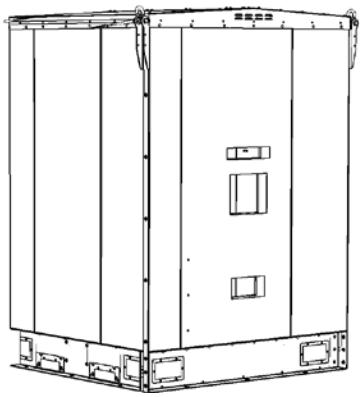
Temporarily attach the Interior Supply & Return Openings Cover to the vertical mounting surface making sure that the sides of the template are plumb.

If there is an existing Return opening, align the top of the Return opening on the Interior Supply & Return Openings Cover to the top of the existing Return opening in the mounting surface and center (or align the sides) as appropriate.



- Mark the centers of the mounting bolt holes and wiring holes onto the vertical mounting surface.
- Mark four corners of the Supply cutout and four corners of Return cutout onto the vertical mounting surface.
- Once all holes and corner locations have been marked, remove the cover.
- Draw lines to connect the corner marks of the Supply and Return cutouts.
- Drill 4 bolt holes and the corner marks of the Supply cutout and the Return cutout with ¾” (19mm) drill bit ensuring that the holes are perpendicular to the vertical mounting surface.

- Using a reciprocating or appropriate saw, cut the Supply and Return cutouts along the template marks drawn.



- Once all holes have been drilled and holes have been cut, test fit the DC HVAC unit to the vertical mounting surface – if adjustments need to be made do so now.
- Remove outside cover panels on the air conditioner so you have access to the inside of the unit to apply washers, lock washers and nuts.

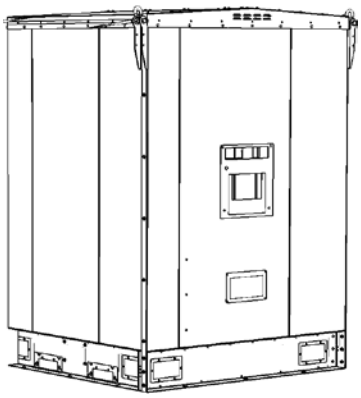
3.3.2 Wall opening preparation

- If the wall is hollow, the wall opening must be lined with aluminum coil stock to prevent air and water leaks.
- System wire harness hole drilling: the intake unit wire harness will be run through the wall to connect into the system controller installed inside the shelter: Drill a hole through the wall where marked using the template in the previous step to run a ½" or ¾" conduit stub through the wall for the harness.

3.4 Mount the HVAC Unit

Typically, only 4 through bolts are required to secure the HVAC unit to the wall. If necessary, two extra bolt hole locations for optional bolts may be installed at the bottom of the unit (see Optional Bottom Mounting Holes in step 3.3.1).

If the optional Blanking Plates kit will be used, apply construction adhesive sealing caulk around the plates near the edges, position the plates and secure them to the enclosure wall using self-drilling screws.



With one person outside and one person inside, position the DC HVAC unit against the vertical mounting surface while taking care to route the wiring through the wiring holes.

Position the Interior Supply & Return Openings Cover on the inside wall surface and secure with self-drilling screws.

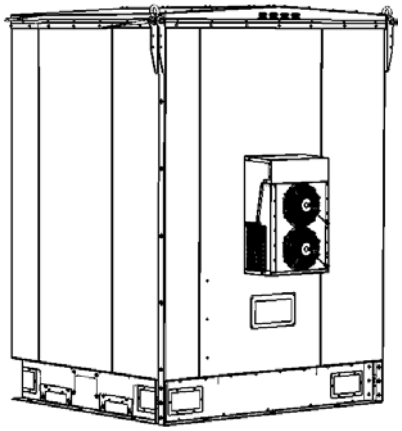
Push the mounting bolts through the bolt holes from inside the enclosure. (Note, the presumed wall thickness is ~5 inches. If the wall is thicker – or thinner – it may be necessary to use alternative bolts than those supplied in the hardware kit that are of a suitable length to pass through the wall and secure the HVAC unit.

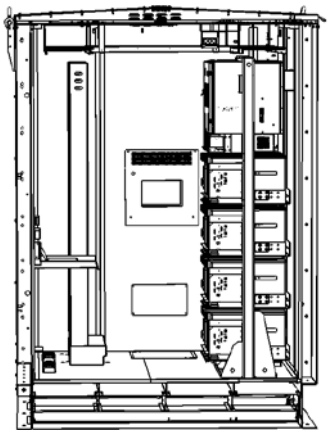
Place flat washers, lock washers and hex nuts on the ends of the bolts inside the HVAC unit to secure the unit to the vertical mounting surface. Bolts should be hand tight.

Once all bolts are installed and the wiring is pulled through the vertical mounting surface into the structure, bolts should be tightened to 40 foot/pounds – take care to not over tighten the bolts.

Place a plastic or rubber grommet around wiring and snap into grill cover wiring hole.

Install the filter on the inside cover.





3.5 Seal the HVAC Unit

IMPORTANT

The HVAC is shipped with a gasket applied to the face that will abut the vertical mounting surface. The gasket is inset from the edges so that it acts as a backstop for the caulking bead that will make a watertight seal between the HVAC unit and the enclosure.

Press the nozzle into the joint with enough pressure to force the caulk into the gap. At the same time, steadily push the nozzle along the joint. If the wall surface is rough, glide the nozzle along the smooth HVAC surface. Apply steady pressure to the trigger or tube and fill the gap with an even bead of caulk. Release the trigger when it reaches the handle.

Only seal the two sides and top. Leave the bottom open for drainage.

3.6 Grounding connections

⚠ WARNING

The system must be grounded both inside and outside. There are ground studs on the HVAC unit and the Interior Supply & Return Openings Cover that must be connected to the exterior site ground or the interior master ground buss using 6 AWG Green/Yellow wire, and two hole, NEMA compression lugs.

3.7 Electrical connections

The system is powered with two circuits from the site -48V DC power plant and has separate controls for the air conditioner compressor, evaporator fan and heating element.

Control signals, power and alarms are transmitted from the HVAC unit to the AF000400 Controller through the factory installed wiring harness. This allows all electrical wiring to be done from inside the enclosure.

3.7.1 Power connection

⚠ DANGER

The HVAC unit requires one 50A circuit breaker for the air conditioning and a second 50A circuit breaker for the heating. The power wiring must be 6AWG to handle the rated current for the circuit breakers.

There are separate DC power connections for the air conditioner and the heater. Each has a dual contact terminal block labelled accordingly.

Note: the system is polarity protected; but exercise care to minimize the chance of possible damage due to improper connections.

Important note: Site Bonding ⚠ CAUTION

Verify that the return buss (positive wire) on the rectifier plant is properly bonded to the site master ground bar.
Do NOT apply power to the AF000404 & AF000405 and Controller if the power plant has not been bonded properly.

3.7.2 Controls

IMPORTANT

The factory installed wiring harness from the HVAC unit contains 3 pairs of 18AWG wire (t-stat wiring for example) to connect into the AF000400 Controller inputs. There is one pair each for Cooling, Heating and Fan operation.

If the AF000400 Controller is not ready for connection, it is possible to temporarily connect the HVAC to a mechanical thermostat (or one that is battery operated) to test that the unit is functioning. Refer to the wiring diagram for connection details.

3.7.3 System alarms

The HVAC unit provides a dry contact alarm to be connected to the AF000400 Controller that indicates when there is an issue with the HVAC unit (high or low pressure switch tripped). The Controller includes a 66 block and alarm wiring to be punched per the customer's guidelines that relays HVAC Fail alarms to the customer. Alarm wire pairs and functions are labeled on the controller door inside.

4 Labelling and Clean up

4.1 Labels

Apply labels to the circuit breakers, thermistor location(s) and fiber tags for the DC power feeds. Secure and dress all wiring with wax string and fish paper.

Apply and verify fan warning labels on the unit outside and inside on the Interior Supply & Return Openings Cover. The HVAC system must never be operated without the Interior Supply & Return Openings Cover securely fastened and warning labels placed.

4.2 Clean up

Close and secure the system covers. Verify that the new system operates as required.

Clean up and remove all debris & trash – regardless who left or made the trash.

5 Documentation

Document all installation steps and record all results and photos according to customer requirements.

Additionally, the checklist in appendix A must be completed and added to the customer installation report (Close Out Package) upon completion of the installation.

PROCESS COMPLETE!

This concludes the mechanical installation of the AF000404 or AF000405 HVAC Unit.

The Schrofftech technical support team can assist you with all installation or troubleshooting questions, do not hesitate to call us at (401) 667-7851 x1.

6 Power Up, Configuration & Test

Refer to the AF000400 Controller Operating Manual (SO000230) for instructions on powering up, configuring and testing the HVAC unit.

7 APPENDIX A: Site Installation verification checklist

Site and installation crew	
Site number (USID# and FA#):	
Site name:	
Completion date:	
Install Company:	
Install representatives:	
AT&T point of contact:	

System installation checklist	Initial or N/A
Exterior verifications	
HVAC unit is properly fastened and caulked on top and sides.	
The air filter is properly installed on the Return opening	
The unused supply (or return) air opening has been covered with supplied metal plate	
Interior verifications	
HVAC unit wall opening is properly protected with grille and fan warning label.	
The unused supply (or return) air opening has been covered with supplied FRP plate	
The HVAC unit is properly connected to the AF000400 Controller	
Wiring verifications	
Power wiring (power plant to controller) uses 6AWG wire and is appropriately run through the shelter (conduit/ladder racks…).	
Power circuit breakers are 50A, of the type for DC Plant and properly seated & labeled.	
All control wiring is properly connected, labeled and is appropriately run through the shelter (conduit/ladder racks…).	
Alarm wiring is labeled and connected to the Controller	
Labeling and cleanup	
All trash and installation debris has been removed	
System labeling is installed and readable	
Safety warning labels on HVAC unit and internal grille are installed and readable	