



## Wireless Products

Extended Battery Reserve Enclosure (EBRE)

Description and Installation Manual (460-200-055), Revision C

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## ADMONISHMENTS USED IN THIS DOCUMENT



**DANGER!** Warns of a hazard the reader *will* be exposed to that will *likely* result in death or serious injury if not avoided. (ANSI, OSHA)



**WARNING!** Warns of a potential hazard the reader *may* be exposed to that *could* result in death or serious injury if not avoided. This admonition is not used for situations that pose a risk only to equipment, software, data, or service. (ANSI)



**CAUTION!** Warns of a potential hazard the reader *may* be exposed to that *could* result in minor or moderate injury if not avoided. (ANSI, OSHA) This admonition is not used for situations that pose a risk only to equipment, data, or service, even if such use appears to be permitted in some of the applicable standards. (OSHA)



**ALERT!** Alerts the reader to an action that *must be avoided* in order to protect equipment, software, data, or service. (ISO)



**ALERT!** Alerts the reader to an action that *must be performed* in order to prevent equipment damage, software corruption, data loss, or service interruption. (ISO)



**FIRE SAFETY!** Informs the reader of fire safety information, reminders, precautions, or policies, or of the locations of fire-fighting and fire-safety equipment. (ISO)



**SAFETY!** Informs the reader of general safety information, reminders, precautions, or policies not related to a particular source of hazard or to fire safety. (ISO, ANSI, OSHA)

# IMPORTANT SAFETY INSTRUCTIONS

## Safety Precautions Definition

Definitions of the safety admonishments used in this document are listed under “Admonishments Used in this Document” on page 5.

## General Safety Precautions

The following precautions shall be observed at all time when handling and installing the enclosure:

- Observe the general safety precautions against personal injury and equipment damage.
- The procedures outlined in this manual are only recommended guidelines. Ensure that all NEC (National Electric Code) and local codes for safety and wiring are followed.
  - Use listed two-hole compression connectors (lugs) to terminate all ground connections. Selected lug shall match wire and type, and crimped applied as specified by the lug manufacturer.
  - Apply NO-OX-ID-A to all ground connections.
  - Insulation of field-wire conductors should be rated no less than 105 °C, and gauge in a manner that is consistent with the NEC and local codes.
- Always use a non-contact voltage detector, when approaching an enclosure, to verify no leaks or shorts are presents on the external body.
- Read Enclosure Placement in its entirety prior to attempting to handle or secure the enclosure.
- A minimum of two persons are required to safely install the enclosure.
- Hard hats and steel-toed boots should be worn while maneuvering the enclosure.
- Safety glasses should always be on while on-site.
- Safety gloves should be on when working in temperature extremes, with batteries, or with sharp objects.
- All electricians, operators, and technicians have been trained for the task at hand.
- Keep bystanders away.
- Ensure that all personnel on site are familiar with the first-aid kit location and emergency procedures in the event of an injury.
- Never leave the enclosure unattended. If leaving the site, close and secure the enclosure.

## **You Must Follow Approved Safety Procedures**



**DANGER!** Performing the following procedures may expose you to hazards. These procedures should be performed by qualified technicians familiar with the hazards associated with this type of equipment. These hazards may include shock, energy, and/or burns. To avoid these hazards:

- a) The tasks should be performed in the order indicated.
- b) Remove watches, rings, and other metal objects.
- c) Prior to contacting any uninsulated surface or termination, use a voltmeter to verify that no voltage or the expected voltage is present. Check for voltage with both AC and DC voltmeters prior to making contact.
- d) Wear eye protection.
- e) Use certified and well maintained insulated tools. Use double insulated tools appropriately rated for the work to be performed.

## **Voltages**

### **AC Input Voltages**



**DANGER!** This system operates from AC input voltage capable of producing fatal electrical shock. AC input power must be completely disconnected from the branch circuits wiring used to provide power to the system before any AC electrical connections are made. Follow local lockout/tagout procedures to ensure upstream branch circuit breakers remain de-energized during installation. **DO NOT** apply AC input power to the system until all electrical connections have been completed and checked.

### **DC Output and Battery Voltages**



**DANGER!** This system produces DC power and may have a battery source connected to it. Although the DC voltage is not hazardously high, the rectifiers and/or battery can deliver large amounts of current. Exercise extreme caution not to inadvertently contact or have any tool inadvertently contact an output terminal or battery terminal or exposed wire connected to an output terminal or battery terminal. **NEVER** allow a metal object, such as a tool, to contact more than one termination or battery terminal at a time, or to simultaneously contact a termination or battery terminal and a grounded object. Even a momentary short circuit can cause sparking, explosion, and injury.

## **Battery**

Refer to the battery manufacturer documentation for specific battery safety instructions. The following are general guidelines.



**WARNING!** Correct polarity must be observed when connecting battery leads.



**WARNING!** Special safety precautions are required for procedures involving handling, installing, and servicing batteries. Observe all battery safety precautions in this manual and in the battery instruction manual. These precautions should be followed implicitly at all times.



**WARNING!** A battery can present a risk of electrical shock and high short circuit current. Servicing of batteries should be performed or supervised only by properly trained and qualified personnel knowledgeable about batteries and the required precautions.

The following precautions should be observed when working on batteries:

- Remove watches, rings, and other metal objects.
- Eye protection should be worn to prevent injury from accidental electrical arcs.
- Use certified and well maintained insulated tools. Use double insulated tools appropriately rated for the work to be performed. Ensure that wrenches with more than one working end have only one end exposed.
- Do not lay tools or metal parts on top of batteries.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Risk of explosion if battery is replaced with an incorrect type or if polarity is reversed. Recommended to replace batteries with the same manufacturer and type, or equivalent.
- Dispose of used batteries according to the instructions provided with the batteries. Do not dispose of batteries in a fire. They may explode.
- ALWAYS FOLLOW THE BATTERY MANUFACTURER'S RECOMMENDATIONS AND SAFETY INSTRUCTIONS.



**DANGER!** This equipment may be used in conjunction with lead-acid batteries. Working near lead-acid batteries is dangerous!

In addition to the hazard of electric shock, gas produced by batteries can be explosive and sulfuric acid can cause severe burns.

- Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes, and is toxic.
- Batteries contain sulfuric acid.
- Batteries generate explosive gases during normal operation. Systems containing batteries should never be installed in an airtight room or space. Only install in a ventilated environment.
- Batteries are an energy source that can produce high amounts of electrical current.

FOR THESE REASONS, IT IS OF CRITICAL IMPORTANCE THAT YOU READ THESE INSTRUCTIONS AND FOLLOW THEM EXACTLY.

WHEN WORKING WITH LEAD-ACID BATTERIES:

- Follow the recommended PPE requirements per the SDS for the battery to be used.
- If battery acid enters your eye, immediately flush your eye with running cold water for at least 15 minutes. Get medical attention immediately.
- If battery acid contacts skin or clothing, wash immediately with soap and water.



**ALERT!** Performing maintenance and/or troubleshooting procedures may interrupt power to the loads, if battery reserve is not sufficient.

## Specific Safety Precautions



**DANGER!** RISK OF ELECTRICAL SHOCK, GENERAL

All ground connections must be installed and verified prior to connecting any power cables (AC or DC) and turning-up of enclosure.

When connecting any discrete power connection, make the connection first with the ground/return and break last with ground/return.

Do not install equipment showing any physical damage.



**DANGER!** RISK OF ELECTRICAL SHOCK, AC

Proper actions, include, but not limited to:

- a) Verify before contacting the enclosure that no current leakage or ground fault condition is present.
- b) Verify a proper ground is in place.
- c) Verify for AC hook-up, all enclosure circuit breakers are OFF and the utility incoming feed is OFF.

Use a trained licensed electrician.



**DANGER!** RISK OF ELECTRIC SHOCK

The DC bus is powered by DUAL power sources – Rectifiers and DC Batteries.

To properly work on the system, de-energize by disconnecting BOTH power sources. Even with the batteries turned off by using a local battery (circuit breaker) disconnect, batteries are still “LIVE” and hazardous, including a voltage >50 VDC, and a source of high short circuit current.

Use extreme caution around the batteries and terminals.

Do not smoke.



**DANGER!** RISK OF ELECTRICAL SHOCK, OSP CABLES

If joint buried cables are used, check the cable sheath for voltage in accordance with local standards. If voltage is detected, do not proceed with the installation. Contact the supervisor and do not proceed until the voltage hazard is eliminated.



**DANGER!** RISK OF CHEMICAL EXPOSURE

A battery can present harmful chemicals. Refer to the Battery Installation Manuals and MSDS supplied with the batteries. Work in a ventilated area and follow all safety procedures.

At a minimum, wear safety glasses and gloves when working with batteries.



**WARNING!** PREVENT INJURIES, FROM LIFTING THE ENCLOSURE

Follow all local safety practices while lifting the enclosure. Wear all locally approved safety gear. All persons working with lifting equipment must wear standard safety headgear, eye protection, and (when required) gloves.

Keep bystanders away from work operations at all times.

Do not lift the enclosure over people. Do not let anyone work, stand, or pass under a lifted enclosure.

Use all four points (eyebolts) to lift the enclosure.

Do not move or lift the enclosure with the front door open.

Never lift or move the enclosure with batteries or rectifiers installed.

Do not allow the lifting equipment or enclosure to touch any electrical wiring or equipment.

Operate all lifting equipment within safety constraints, as defined by the manufacturer and local practices; for example, do not exceed the capacity of reach.

Do not use slings, clevises or shackles of insufficient capacity.

Crane Operation:

Only properly trained operators shall operate the crane.

Do not operate the crane until all stabilizers are extended. The stabilizers must be in firm contact with the ground or other adequate support structure. Do not retract or extend the stabilizers when the enclosure is suspended from the crane.

Do not lift the enclosure over people. Do not let anyone work, stand, or pass under a lifted enclosure.

Only the crane rigging crew should set up the crane and rigging.

Do not exceed the lifting capacity of the crane.

Forklift Operation:

The forklift must be rated for a lifting capacity of 4,000 lbs (1814 kg), or greater.

Required Equipment:

One hoist, crane, or forklift capable of lifting 4,000 lbs (1814 kg).

Four wire-rope slings, 8-ft. (2.44 m) long (minimum). Each sling should have 1,500 lb. (700 kg) capacity.

Four connecting links (clevises) (rated for a minimum of 1500 lb), to attach the wire-rope slings to the enclosure lifting eyes.

A 75-ft (20 m) rope, 5/8" (1.5 cm) in diameter, to use as a tagline. A tagline is used to guide the enclosure into position while it is lifted and lowered.



**CAUTION!** PREVENT EQUIPMENT DAMAGE, PROPER HANDLING

Do not stack nor lay the enclosure on its side.

Similarly, do not stack batteries or lay them on their side. Do not tip batteries -- keep in upright position at all times.

To avoid possible personnel injury or damage to the enclosure, do not remove it from the pallet until at the installation site, at the point of transfer onto the pad.



**DANGER!** PREVENT EQUIPMENT DAMAGE, MAINTAIN VENTILATION

To optimize the service life of this equipment, make sure there are no obstructions in front of the ventilation openings.



**WARNING!** RISK OF INJURY, FROM UNSECURED ENCLOSURE

Do not push or lean against an unsecured (unbolted) enclosure as it may tip over causing bodily injury.

Do not pull cables, terminate cables, install or place any batteries or rectifiers until enclosure has been secured onto a pad.

Use caution when opening and closing doors to an enclosure not secured onto a pad.



**WARNING!** RISK OF INJURY TO EYES AND SKIN, FROM OPTIC DEVICES

Do not look into a fiber cable or device, nor hold such cable or device against body, fabric or other material.



**WARNING!** RISK OF HAZARDOUS SUBSTANCES

After handling of the enclosure or any such component, such as batteries, cables, busbars, etc., always wash hands immediately after.



**WARNING!** RISK OF EXPLOSION

For safety reasons, never restrict or block the airflow through the door or entry panel ventilation openings.



**CAUTION!** PREVENT EQUIPMENT DAMAGE, FROM CONDENSATION

Until the enclosure is turned up for service, the bags of desiccant shipped with the enclosure must remain in the enclosure to prevent condensation.

Once service is in-place, remove the desiccant.



**CAUTION!** PREVENT EQUIPMENT DAMAGE, BUILD A GOOD PAD

The pad should be level to within 1/4 in (6.4 mm) over the entire length and width, with a crown in the middle to prevent any pooling of water and twist to the enclosure frame.

When mounting the enclosure on a pad, the compression strength of the concrete pad used must be a minimum of 4000 psi as determined by ASTM C39 test of compression strength of concrete cylinders.

Always use a barrier pad between the concrete and the pad to prevent corrosion.



**CAUTION!** PREVENT EQUIPMENT DAMAGE, OPERATING TEMPERATURE

The enclosure is approved for operation in an environment with an expected temperature range of -40°F to +115°F (-40° C to +46°C) and 5% to 95% relative humidity range, condensing. Do not use at temperatures or humidity exceeding these ranges.

The enclosure is not for indoor use.



**CAUTION!** PREVENT DAMAGES CAUSED BY ELECTROSTATIC DISCHARGES (ESD)

When handling the ECU unit, wear an appropriate antistatic device (a wrist strap for example) that is properly connected to a designated antistatic grounding point (on a framework, on an anti-static floor mat, etc.). ESD-protective packaging material shall also be used when carrying/shipping the ECU unit.

## Personal Protective Equipment (PPE)



**DANGER!** ARC FLASH AND SHOCK HAZARD.

Appropriate PPE and tools required when working on this equipment. An appropriate flash protection boundary analysis should be done determine the “hazard/risk” category, and to select proper PPE.



Only authorized and properly trained personnel should be allowed to install, inspect, operate, or maintain the equipment.

Do not work on LIVE parts. If required to work or operate live parts, obtain appropriate Energized Work Permits as required by the local authority, per NFPA 70E “Standard for Electrical Safety in the Workplace”.

## Hazardous Voltage



**DANGER!** HAZARD OF ELECTRICAL SHOCK.

More than one disconnect may be required to de-energize the system before servicing.

## Handling Equipment Containing Static Sensitive Components



**ALERT!** Installation or removal of equipment containing static sensitive components requires careful handling. Before handling any equipment containing static sensitive components, read and follow the instructions contained on the Static Warning Page.

## Maintenance and Replacement Procedures



**CAUTION!** When performing any step in procedures that requires removal or installation of hardware, use caution to ensure no hardware is dropped and left inside the unit; otherwise service interruption or equipment damage may occur.



**NOTE!** When performing any step in procedures that requires removal of existing hardware, retain all hardware for use in subsequent steps, unless otherwise directed.

## STATIC WARNING



This equipment contains static sensitive components. The warnings listed below must be observed to prevent damage to these components. Disregarding any of these warnings may result in personal injury or damage to the equipment.

1. Strictly adhere to the procedures provided in this document.
2. Before touching any equipment containing static sensitive components, discharge all static electricity from yourself by wearing a wrist strap grounded through a one megohm resistor. Some wrist straps have a built-in one megohm resistor; no external resistor is necessary. Read and follow wrist strap manufacturer's instructions outlining use of a specific wrist strap.
3. Do not touch traces or components on equipment containing static sensitive components. Handle equipment containing static sensitive components only by the edges that do not have connector pads.
4. After removing equipment containing static sensitive components, place the equipment only on conductive or anti-static material such as conductive foam, conductive plastic, or aluminum foil. Do not use ordinary Styrofoam™ or ordinary plastic.
5. Store and ship equipment containing static sensitive components only in static shielding containers.
6. If necessary to repair equipment containing static sensitive components, wear an appropriately grounded wrist strap, work on a conductive surface, use a grounded soldering iron, and use grounded test equipment.

# ABOUT THIS DOCUMENT

## Purpose

This practice provides a description of Vertiv’s Extended Battery Reserve Enclosure (EBRE) as well as installation instructions.

## Reason for Reissue

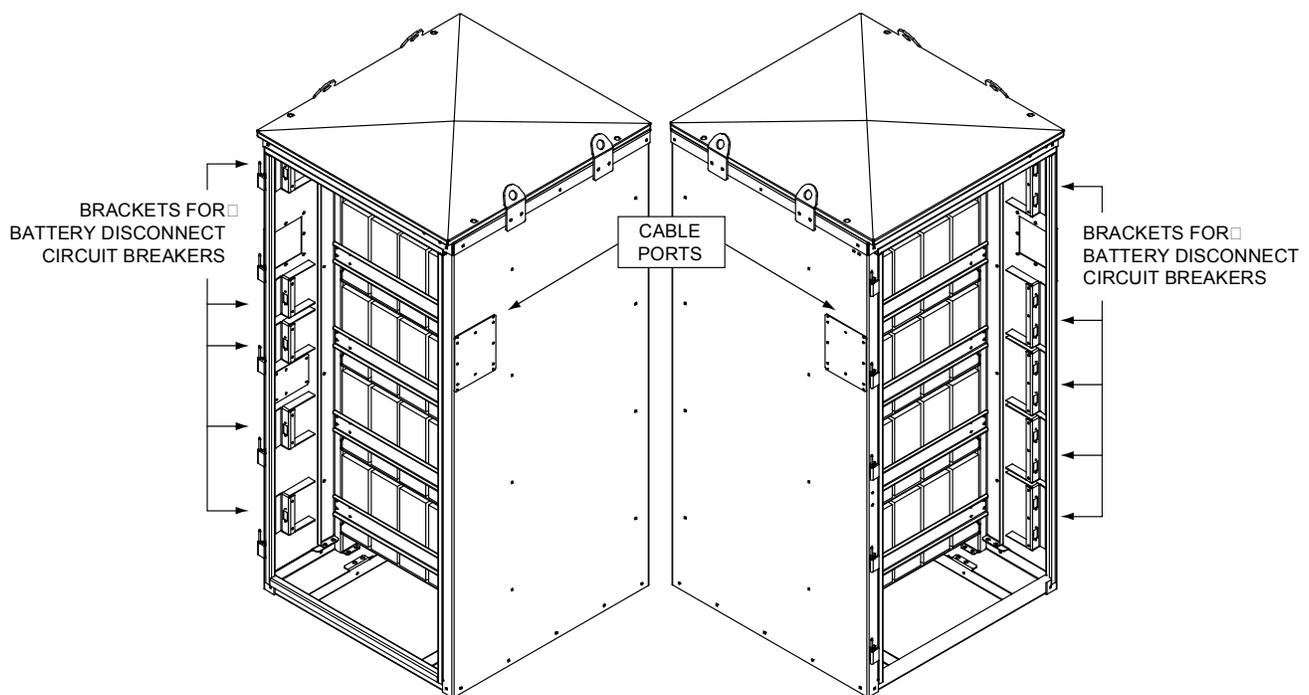
Whenever this practice is reissued, the reason for reissue will be stated in this paragraph.

## Information Not Provided in this Practice

Refer to other local practices or building codes as applicable for the correct methods, tools and materials to be used in performing procedures not specifically described in this document.

**NOTE!** *The information contained in this practice is subject to change without notice and may not be suitable for all applications.*

**Figure 1:** Extended Battery Reserve Enclosure (EBRE)



# DESCRIPTION

## Application

Vertiv's Extended Battery Reserve Enclosure (EBRE) (**Figure 1**) provides a stable environment for battery backup and is designed to provide supplemental DC power backup in the event of a commercial AC power failure.

The enclosure provides thermal control to extend battery life and optimize battery performance.

## Physical Specifications

The EBRE has an off-white multistage dry powder polyester paint finish for maximum durability and performance.

The EBRE has four lifting brackets at the top that allows it to be lifted into position.

The EBRE contains a door mounted air conditioner to maintain a constant internal temperature.

## Standards Compliance

The EBRE is designed to meet the following standards:

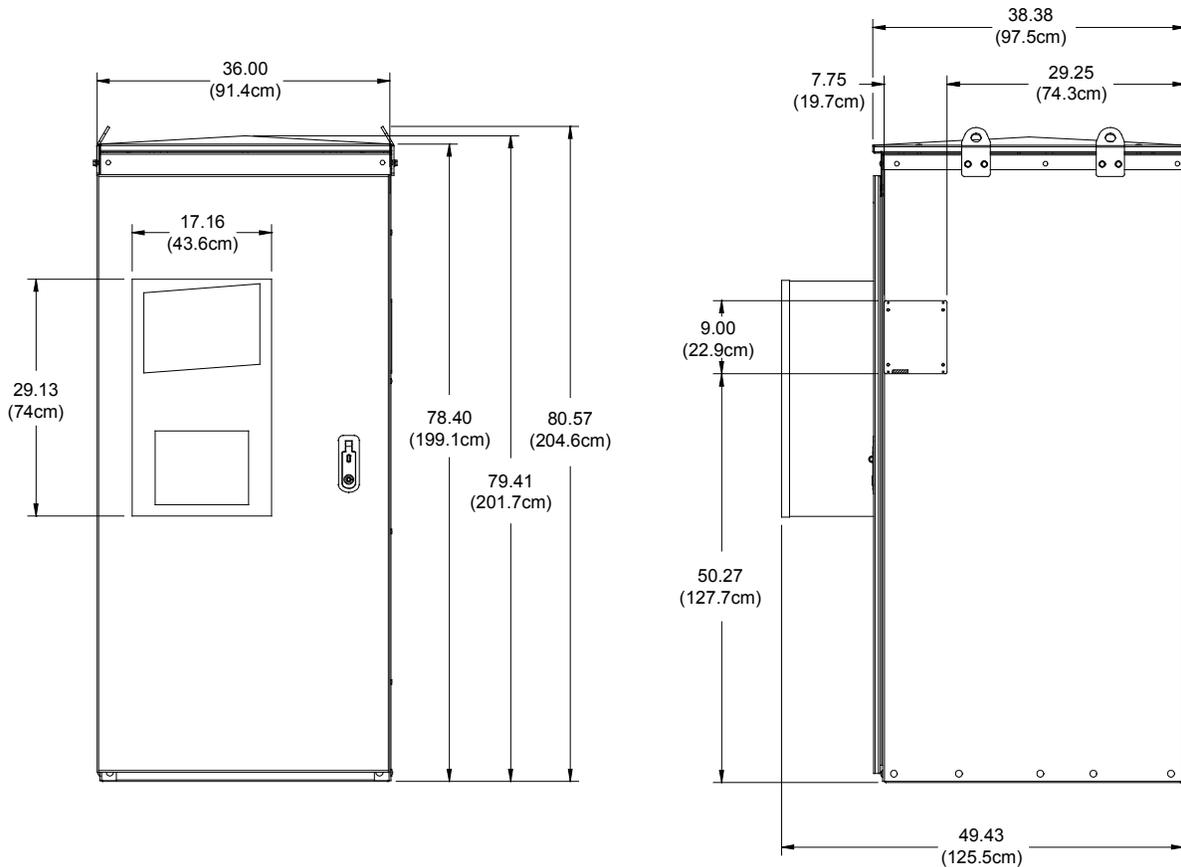
- Telcordia GR-487-CORE, Issue 2, March 2000, Generic Requirements for Electronic Equipment Enclosures (Cabinets).

## Enclosure Dimensions

Dimensions for the EBRE are illustrated in **Figure 2**.

- Height: 79.41" (201.70 cm) over the highest part of the solar shield
- Depth: 48.38" (122.89 cm) including the Heat Exchanger
- Width: 36" (91.44 cm)
- Weight: 960 lbs (435.45 kg) as shipped

**Figure 2:** Extended Battery Reserve Enclosure Dimensions



## Enclosure Features

### Battery Backup

The EBRE houses fifteen (15) strings at 24VDC of 12Vdc 150-190Ah front post batteries to provide backup power for existing sites. Backup time will vary depending on the load.

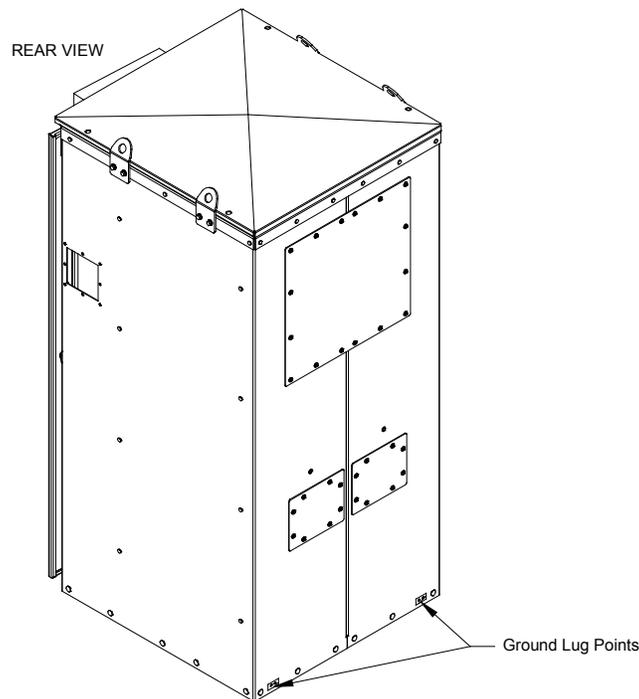
The EBRE is capable of housing many battery types, including the following:

Battery Type	Capacity
GNB	155 Ah
East Penn Mfg./DEKA	150 Ah
EnerSys/Hawker	155 Ah
Northstar	170 Ah
EnerSys	170 Ah
EastPenn	170 Ah

## Grounding

The enclosure requires one (1) ground connection using a 2 AWG wire. Two ground points are located at the bottom rear left and right parts of the enclosure, as shown in **Figure 3**.

**Figure 3:** Ground Lug Location



- A dual-hole lug that fits over 0.25" studs at 0.75" centers is included in the enclosure's mounting hardware kit.
- The all-metal structure of the enclosure is bonded together from a ground perspective.

## Mounting Options

The enclosure is designed to be platform-mounted or pad-mounted. The enclosure has four lifting brackets at the top that allow the enclosure to be lifted. The enclosure may also be grate-mounted.

When the enclosure is installed on a concrete pad, a masticated rubber (reground automotive tires) barrier pad shall be placed between the enclosure and concrete pad during installation to prevent corrosion of the aluminum base by the concrete pad.

- Use appropriate anchors to secure enclosure to concrete pad.

## Cable Entry

All ancillary and DC power cables will enter and exit through cable ports located on both sides of the main chamber. See **Figure 1**.

### Wind latch

A wind latch on the door of the enclosure (**Figure 4**) keeps the door secure when open. To use the wind latch, open an enclosure door wide enough so that the shoulder of the wind latch slides into the hole and slot at the end of the bar. Lift up on the wind latch to close the door.

**Figure 4:** Wind Latch



### Door Locks

The enclosure is equipped with Southco type locks that secure the doors. The turn fasteners are opened with a Telco 216-type tool supplied with the enclosure.

### Environmental Control

The EBRE is factory equipped with a 4000 BTU air conditioner mounted to the battery compartment door.



**ALERT!** The air conditioner is adjusted and tested from factory with the following temperature settings:

HEATING			COOLING		
Dial Setting	ON	OFF	Dial Setting	ON	OFF
46°F	41°F	46°F	77°F	82°F	77°F

- The unit requires a feed of 240VAC, 15A slow blow circuit breaker. Its acoustic noise is limited at 71dBA, measured per Telecordia standard.
- A 15 Amp twist and lock power outlet is provided within the battery compartment for the air conditioner.



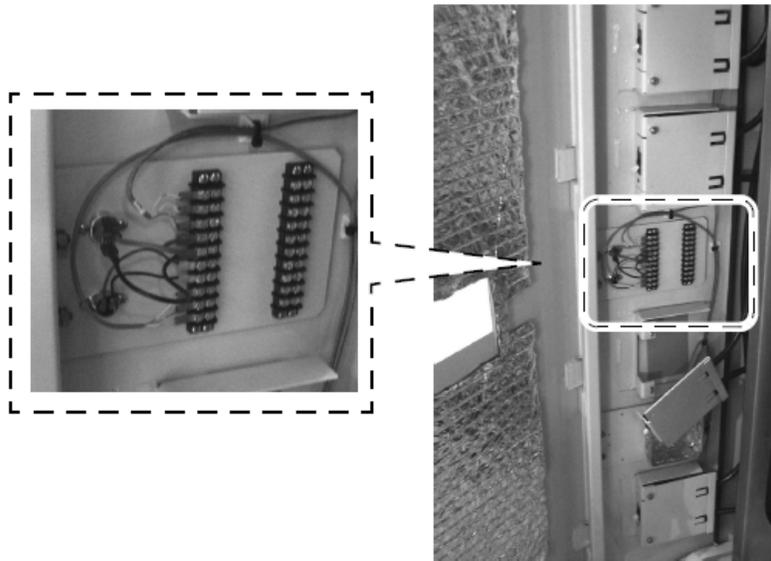
**NOTE!** For details on start-up and maintenance, refer to the air conditioner manufacturing instructions shipped with the unit.

### Alarms

The EBRE is equipped with intrusion, high-temperature, air conditioner fail and circuit breaker alarms:

- Two 10 position screw down blocks are available within the battery compartment for alarm connections, as shown in **Figure 5**.

**Figure 5:** Alarm Block



- An alarm pinout is specified in one of the schematic drawings shipped with the enclosure.
- The intrusion alarm triggers whenever the door is opened. It can be disabled by pulling the alarm plunger completely forward.

### Loose Parts

The EBRE is shipped with the following loose parts:

- Four (4) 1/2"-13x1.5" mounting bolts,
- Eight (8) 1/2" flat washers,
- Four (4) 1/2" lock washers,
- Four (4) 1/2"-13 nuts,
- Four (4) 3/8"-16x1.5" mounting bolts,
- Eight (8) 3/8" flat washers,
- Four (4) 3/8" lock washers,
- Four (4) 3/8"-16 nuts,
- a rubber mat,
- installation practice,
- schematic drawings, and
- a user manual for air-conditioning unit.

# OPENING AND CLOSING THE ENCLOSURE DOORS

## Purpose

This section describes the locking mechanisms on the doors of the enclosure and explains how to open and close the doors. Refer to this section whenever instructed to open or close enclosure doors.

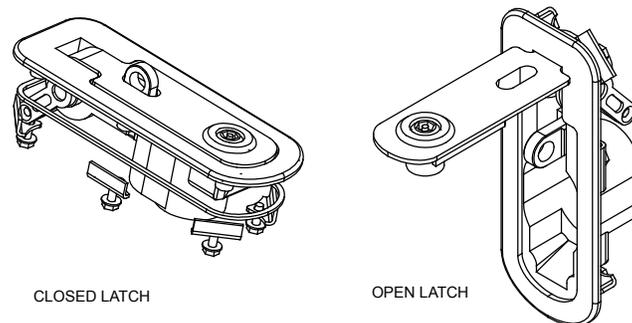
## Tools Required

A tamper-resistant socket wrench, which is shipped with the enclosure, will be used in performing the procedure.

## Opening a Door

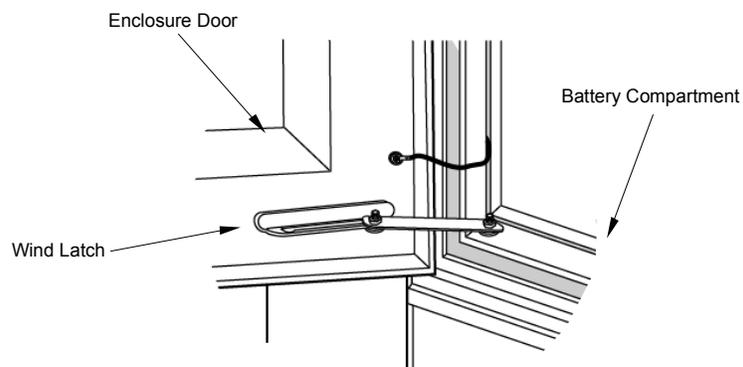
Perform the following steps to open a door:

**Figure 6:** Door Lock



1. If required, use a key to unlock the door according to local practices.
2. Insert the tamper-resistant wrench into the cup sems hex bolt.
3. Turn the bolt a few degrees counter clockwise to release the latch.
4. Lift the latch to open the door, as shown in **Figure 6**.
5. Pull the door open wide, enough to secure the wind latch at the bottom or top of the door. The wind latch is secured when the shoulder engages the hole and slot at the end of the bar. (See **Figure 7**.)

**Figure 7:** Wind Latch





# INSTALLATION CONSIDERATIONS

## Site Selection

The enclosure may be installed on a new or existing pad or metal platform. Obtain rights-of-way and other permits (building permit, electrical permit, etc.), depending on local codes and authorities, prior to installing the enclosure.

The mounting pad or platform must be installed (according to local practices) before the enclosure can be installed.

Consider the following when deciding on the location for the rooftop site:

- Obtain all necessary building permits and other local approvals as necessary per local building codes.
- Select locations that will provide enough space to place the mounting platform and enclosure, and provide safe working conditions.
- Select locations where there are no electrical lines that could touch the enclosure and energize it.

Consider the following when deciding on the location for the concrete pad or platform:

- Place the enclosure on servitudes, on dedicated (recorded) easements, or on property owned by the company. Avoid any unrecorded easements.
- Use public safety road and street rights of way only where there is enough space to place the enclosure and provide safe working conditions. The enclosure should be easily accessible with adequate parking to ensure safety for people and vehicles. Place the enclosure where it will not create a visual or physical obstruction to either vehicles or pedestrians.
- Select locations that will minimize accidental or intentional vandalism. Consider the use of protective posts when the enclosure is located near parking areas where vehicles could back into it. Do not place the enclosure in ditches or areas subject to flooding. Do not place the enclosure in an area where the pad is subject to vehicle loads.
- If an area is subject to frost, choose a site free of heaving.

All enclosure grounding and ground ring must be installed prior to turn up of enclosure.

## Installing a Concrete Pad

The enclosure may be installed on a cast-in-place or precast concrete pad. The pad should be in place and cured before the enclosure can be installed.

Use concrete only for the foundation pad. Do not use substitute materials, such as reinforced plastics, since they lack the rigidity required for enclosure placement.

Form preparation (follow local practices or building codes if different than the information included in this section).

## Procedure

1. If the soil is not firm, compact it. For a typical installation, excavate the foundation hole to a depth of 12 to 15 inches (30.48 to 38.1 cm).
2. Construct a level base for the pad, using a minimum of 6 inches (15.24 cm) of sand or gravel. The pad should be level to within 1/4-inch (6.35 mm) over the entire length and width.
3. Dig a trench where the cable and electrical conduit will rise into the enclosure. Excavate the trenches to a depth of 30 inches (76.2 cm) for a standard installation, and 60 inches (152.4 cm) for areas where there is heavy frost.
4. Install a ring ground system around the proposed foundation pad according to local practices and safety codes.
5. Place the wire mesh (5 x 4, 4 gauge) in the form according to local practices. Be sure the wire mesh is centered vertically.



**NOTE!** No. 3 (3/8-inch or 9 mm) or larger reinforcing rod, placed on 15-inch (38.1 cm) centers may be used in place of wire mesh.

6. Before pouring the concrete, be sure that all the wire mesh or reinforcing bars are set approximately 2 inches (5.08 cm) off the bottom of the form.
7. If required, use local practices to treat the area below the pad and for two feet (60.96 cm) around the perimeter against insect infestation.
8. Use a high-early strength concrete mix so the enclosure may be placed three days following concrete pouring. Coarse aggregate used in the concrete shall be graded from 3/4-inch (1.9 cm) to No. 4 only. The compression strength of the concrete must be a minimum of 4000 psi as determined by ASTM C39 test of compressions strength of concrete cylinders.
9. Pour the concrete.
10. Cure the pad in a moist environment for a minimum of three days before enclosure installation, or according to the type of concrete used, and/or local practices. Do not install the enclosure or support any significant load before the pad is completely cured. After the second day, the forms may be removed.

## Transportation and Storage



**WARNING!** UNSECURED ENCLOSURE SECTIONS CAN TIP OVER PRESENTING A RISK OF INJURY OR EQUIPMENT DAMAGE.

Follow all appropriate local safety and handling practices when transporting the enclosure to a staging or installation site, or storing it.



**NOTE!** The enclosure is shipped in protective packaging on a wooden pallet. Separate pallets MAY contain batteries and mounting kit (ordered separately).

 **ALERT!** To avoid possible damage to the enclosure, do not remove the packaging or pallet from the packages until they are at the installation or staging site. Do not stack units for transportation or during storage.

 **ALERT!** If the covering on the packaging seems excessively damaged, do not accept the unit or component from the shipper. The damaged packaging may mean the inside of the enclosure could also be damaged, even though the outside seems fine.

When components are on a pallet, use lifting equipment, such as a crane or forklift, appropriately rated for the weight of the load to raise the component and pallet.

Store the components upright to avoid possible damage.

## Unpacking the Enclosure

 **CAUTION!** Do not open the air conditioner door on the enclosure unless the enclosure is secured to the pallet or the mounting surface. An unsecured enclosure is unstable and could tip over causing injury or equipment damage.

Inspect the outside of the enclosure to be sure there is no shipping damage. If there is damage, note where the damage is and how much damage there is. Follow local practices for reporting and handling damaged goods. Do not proceed with the installation. If the enclosure appears undamaged, go on to unpack and install the enclosure.

Carefully remove all packaging material from around the enclosure and the pallet. Dispose of the packaging according to local practices. **DO NOT REMOVE THE PALLET UNTIL THE ENCLOSURE IS READY TO BE MOUNTED.**

## Lifting Preparation

 **CAUTION!** Follow all local safety practices while lifting the enclosure. Wear all locally approved safety gear. Keep bystanders away from work operations at all times. All persons working with lifting equipment must wear standard safety headgear, eye protection, and (when required) gloves.

### Crane operation

- Only properly trained operators shall operate the crane.
- Do not operate the crane until all stabilizers are extended. The stabilizers must be in firm contact with the ground or other adequate support structure. Do not retract or extend the stabilizers when the enclosure is suspended from the crane.
- Do not lift the enclosure over people. Do not let anyone work, stand, or pass under a lifted enclosure.
- Forklift operation
- The forklift must be rated at 4,000 lbs (1814 kg).
- **RISK OF ELECTROCUTION.** Do not allow the lifting equipment or enclosure to touch any electrical wiring or equipment

### Equipment Required:

- One hoist or crane capable of lifting 4,000 lbs (1814 kg).



**NOTE!** The weight of the enclosure is approximately 960 lbs (435.45 kg). DO NOT LIFT THE ENCLOSURE WITH BATTERIES INSTALLED.

- Four wire-rope slings, 8-ft. (2.4 m) long (minimum). Each sling should have 1,500 lb. (680.39 kg) capacity.
- Four connecting links (clevises), to attach the wire-rope slings to the enclosure lifting plates.
- A 75-ft. (22.86 m) rope,  $\frac{5}{8}$  inches in diameter, to use as a tagline. A tagline guides the enclosure into position while it is lifted.

### Enclosure Preparation

A schematic diagram of the AC electrical wiring is attached to the front door of the enclosure for reference.

The enclosure is shipped with the 216-type tool attached to the battery compartment door to be used for opening the door.

#### Procedure

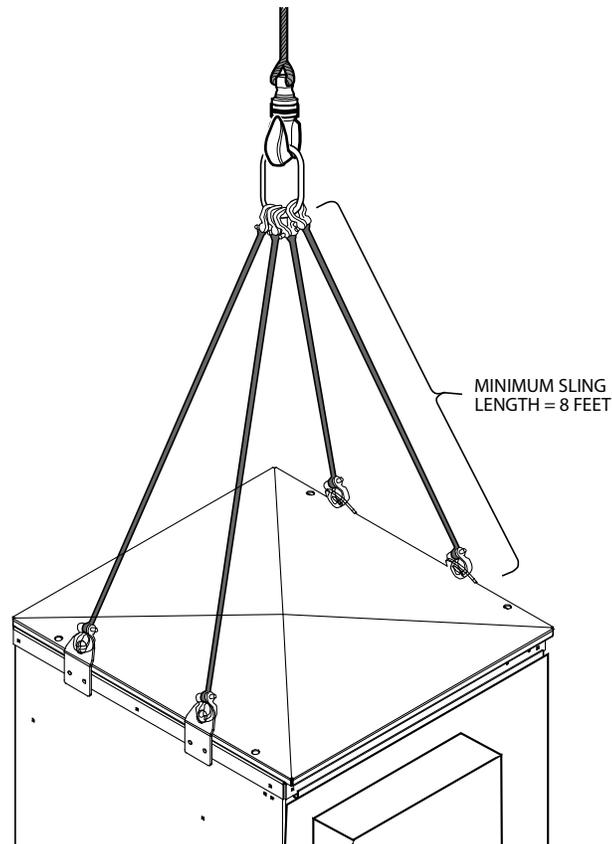
1. While the enclosure is secured to the pallet, use the 216-type tool to open the door.



**CAUTION!** The door with the heat exchanger / air conditioner is very heavy. Do not lean or pull on it.

2. As the door is opened, secure the wind latch. Open the door until the shoulder slides into the slot at the end of the bar. To release the wind latch, lift up on the lower bar.
3. Inspect moving parts, mounting hardware, and connectors. In case of damage, follow local procedures for reporting damage. Close the enclosure door after completion of inspection.
4. Check the packing slip and make sure all parts ordered are received.
5. Insert the cable sling securely through the four lifting eye brackets. Lift the cable with the crane to take up the cable slack.
6. Use a  $\frac{5}{8}$ " (1.59 cm) diameter rope, approximately 75-ft. (22.86 m) long as a tag line.

**Figure 9:** Lifting the Enclosure



## Placing the Enclosure on a Concrete Pad

### Tools Required

The following tools are required in performing the procedure:

- a 0.62" concrete drill bit for  $\frac{1}{2}$ "-13 bolts,
- a 0.50" concrete drill bit for  $\frac{3}{8}$ "-16 bolts,
- a  $\frac{9}{16}$ " socket wrench, and
- a  $\frac{3}{4}$ " socket wrench.

Perform the following steps in securing the enclosure on a concrete pad:

1. Remove the perforated cutout from the rubber barrier pad. Use the pad as guide when drilling holes on the concrete pad.
2. Drill the holes according to the recommended anchor hole size.
3. Clean all debris from the concrete pad where the enclosure will be placed.

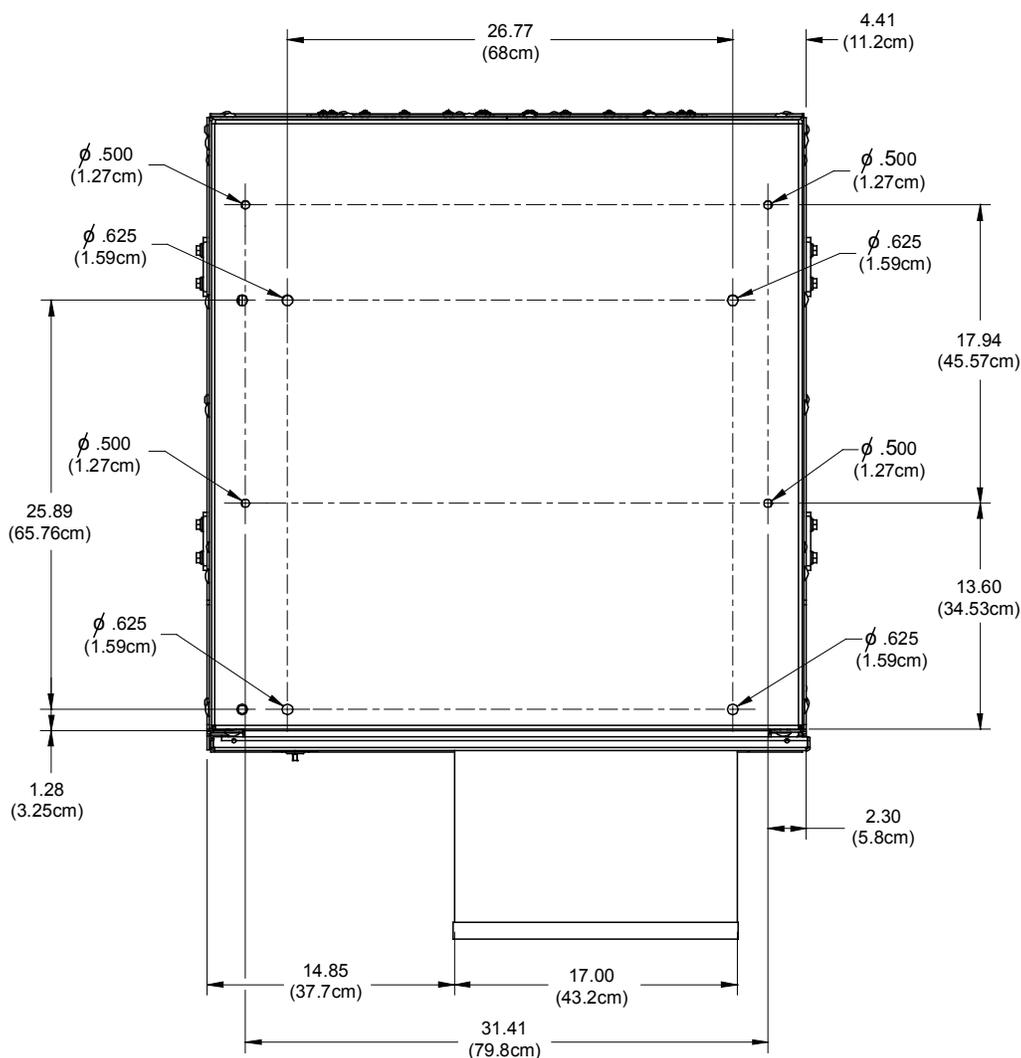
4. Place the rubber barrier pad on the concrete pad to prevent corrosion on the enclosure's mounting surfaces.
5. Close and latch the enclosure door in preparation for lifting/placement.



**ALERT!** During lifting, the enclosure must be lowered so that the enclosure is level and parallel to the platform. Place the enclosure so that it lines up with the anchor bolt locations.

6. Lift the enclosure off the truck and onto the pad. Refer to **Figure 10** when orienting the enclosure.

**Figure 10:** EBRE Mounting Dimensions



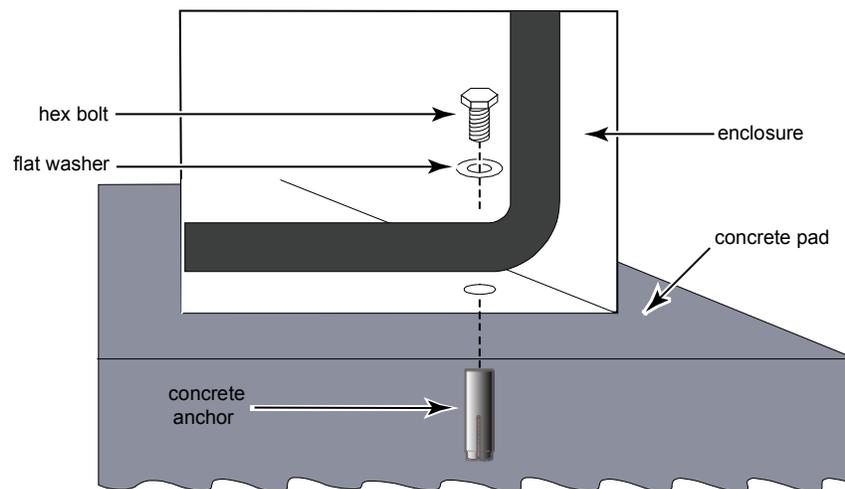
- Use a  $\frac{9}{16}$ " and/or a  $\frac{3}{4}$ " socket wrench when installing the mounting hardware through the mounting holes at the bottom interior structure and into the concrete pad. See **Figure 11** for mounting reference.



**NOTE!** Areas in seismic zones 3 and 4 are required to mount all 8 bolts (as shown in **Figure 10**). For areas in seismic zone 2 or less, either the 1/2"-13 mounting bolts or the 3/8"-16 mounting bolts can be used.

- When the enclosure is secured, remove the slings and lifting brackets.

**Figure 11:** Attaching the Enclosure to the Concrete Pad



## Placing the Enclosure on a Platform

### Hardware and Tools Required

The following tools are required in performing the procedure:

- Four mounting bolts and matching hardware suitable for platform-mounting ( $\frac{3}{8}$ -inch hardware recommended), and
- Four mounting bolts and matching hardware suitable for platform-mounting ( $\frac{1}{2}$ -inch hardware recommended), and
- $\frac{9}{16}$ " and  $\frac{3}{4}$ " socket wrenches.

Perform the following steps in securing the enclosure on a platform:

- Check to make sure the door is closed and secured.
- Lift the enclosure off the truck and onto the platform mounting position.

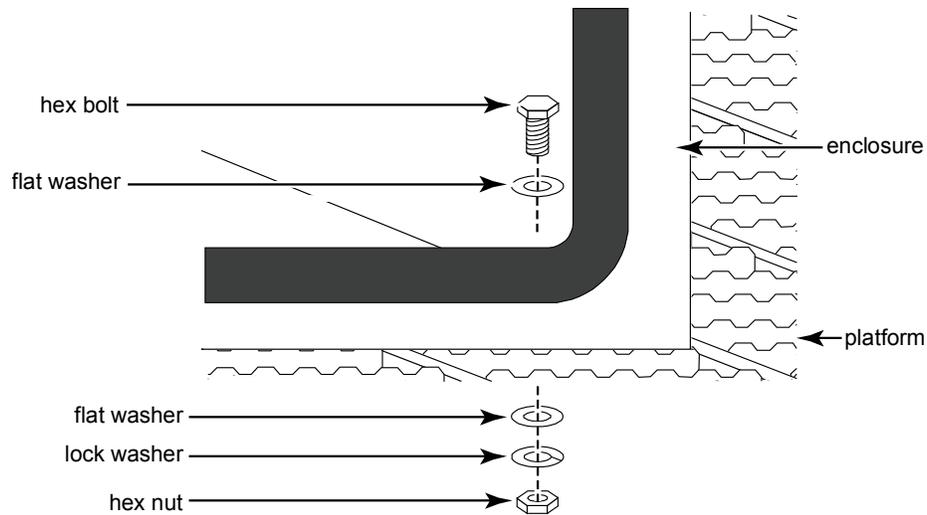


**ALERT!** During lifting, the enclosure must be lowered so that the enclosure is level and parallel to the platform. Place the enclosure so that it lines up with the anchor bolt locations.

- Refer to **Figure 10** when orienting the mounting bolts and placing the enclosure. Orient the enclosure on a platform according to local practices.

4. Open the enclosure door and remove the front cross braces (2), bottom battery retainer assembly, and the bottom shelf to gain access to the mounting locations.
5. Secure the enclosure by installing the mounting hardware through the mounting holes in the bottom interior structure and into the platform, as shown in **Figure 12**.

**Figure 12:** Attaching the Enclosure to the Platform



6. When the enclosure is secured, remove the slings and lifting brackets.

# INSTALLING BATTERIES

The battery compartment holds up to fifteen (15) strings at 24VDC of 12Vdc 150-190Ah front post batteries.

- Two batteries make one string at +24Vdc (**Figure 19**).



**NOTE!** *The enclosure is not shipped with batteries installed. The batteries are to be installed in the field.*



**WARNING!** ELECTRICAL HAZARD. Risk of fatality or serious injury and/or equipment damage.

Exercise extreme care when handling the batteries and connecting them to the string. Two people are recommended for lifting and placing batteries. Wear heavy gloves and safety glasses while lifting the batteries. Handle each battery **ONLY** by its lifting slot. Keep hands well away from the connector posts.

Arcing is possible during battery connection procedures. Use heavy gloves during all procedures involving the batteries to avoid potential injury. Do not wear rings, metallic wrist bands or bracelets when working on batteries. Do not allow metal objects to rest on the batteries or to fall across the terminals.

Make sure both PCU ON/STANDBY switches are set to STANDBY and the battery disconnect breakers are set to “OFF”.

## Installation Procedure

Perform the following procedure to install batteries in the EBRE:

1. If not done already, open the front door and ensure all breakers are in the “off” position.
2. Using a Digital Multimeter (DMM), measure the battery voltages to make sure all batteries are in good condition. A good battery will indicate approximately 12.5Vdc. Per internal battery procedures, replace any battery measured at less than 11.0Vdc.
3. If necessary, remove all the connecting hardware from the battery terminals.
4. Coat all battery terminals with an anti-oxidation compound.
5. Locate the interconnect busbars, covers, and lug bolts in the battery kit.
6. Remove battery restraint brackets from the battery shelves and set them aside for reuse later. It is suggested that activities be performed on a shelf-by-shelf basis to reduce potential for misplacing hardware.
7. Ensure cables will be in an accessible position after batteries are installed.

**Figure 13:** Typical Battery Lift



**⚠ DANGER!** BATTERY LIFTING HAZARD. Risk of serious injury if proper battery lifting procedures are not observed. Each battery typically weighs approximately 160 lbs.

8. Install the batteries into each battery shelf of the battery compartment. See **Figure 14**.

**Recommended Battery Lifting Procedure:** Stage the batteries for battery shelves that are above waist high on a portable lift, such as that shown in **Figure 13**. The portable lift shall have adequate weight-lifting capacity to safely lift 600 lbs (maximum weight of four batteries) to a height of 60 inches. Required table surface size is 20"x20", minimum. Lift each set of batteries until the batteries bottom edges align with the bottom edge of the battery shelf. Ensure the lift is positioned so that the gap between the lift's table and the battery shelf is less than the length of the batteries. Carefully slide each battery from the lift table to the proper position in the battery shelf.

9. Secure batteries within the battery rack with the previously removed restraint brackets. Some batteries may require spacer blocks if undersized for the battery shelf.
10. For each battery shelf, connect a battery interconnect busbar between the first and second (from the left) batteries as shown in **Figure 14**.

**🔍 NOTE!** When ordered, batteries are generally shipped with battery interconnect busbars. The battery interconnect busbars are approximately 3.25-in long.

11. For each battery shelf, connect a battery interconnect busbar between the third and fourth, and fifth and sixth (from the left) two batteries as shown in **Figure 14**.

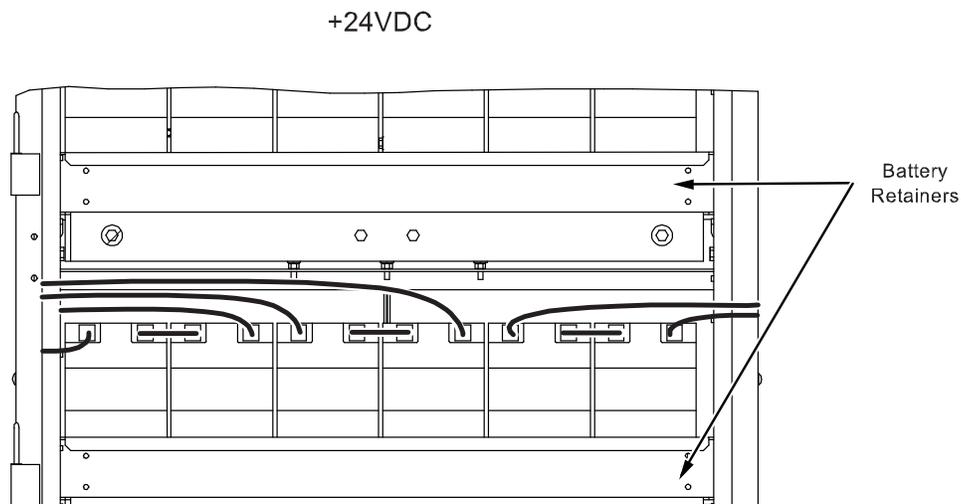
**⚠ CAUTION!** To prevent arcing, the positive (+) battery cables must be connected to a positive (+) battery terminal and the negative (-) battery cable must be connected to the negative (-) battery terminal.

12. Locate two BLACK pre-wired negative (-) battery cables (originating from the Cabinet's Battery Return Busbar).
13. Connect the negative (-) battery cable to the negative (-) battery terminal of the first battery (from left). Connect the other negative (-) battery cable to the negative (-) battery terminal of the third and 5th batteries. Refer to **Figure 14** for battery cable routing. See **Figure 15** for a battery layout diagram.

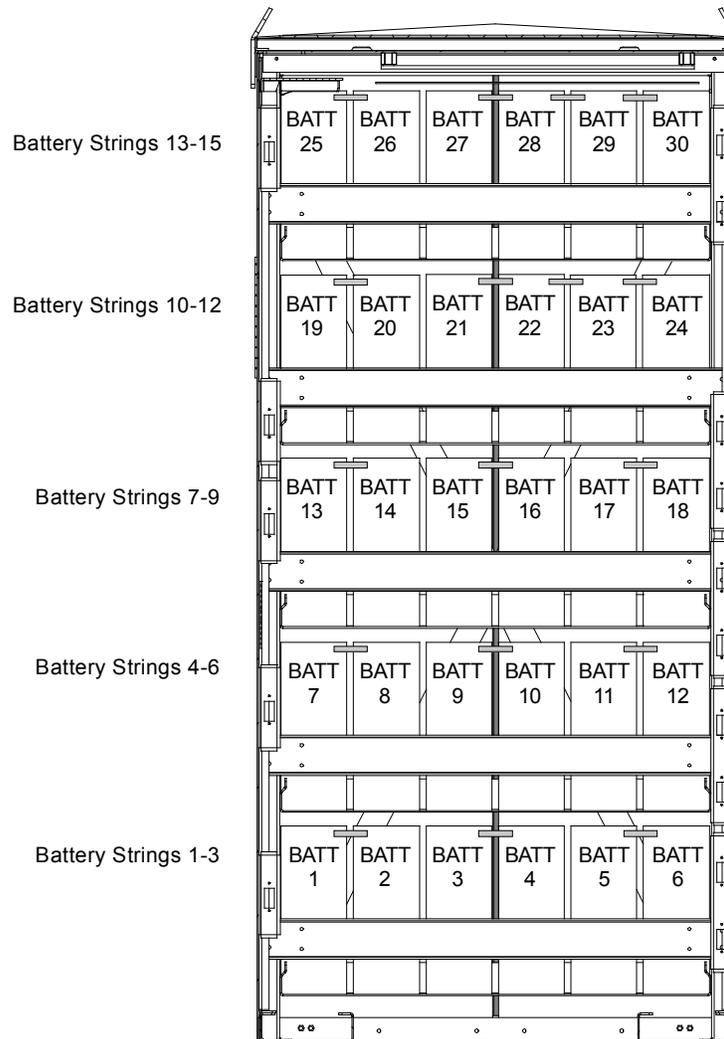
**NOTE!** Ensure the battery disconnect circuit breakers located on the left and right sides of the battery shelf are in the "OFF" position before performing the next steps.

14. Locate three BLACK pre-wired negative (-) battery cables (originating from the Cabinet's Battery Return Busbar).
15. Locate the pre-wired positive (+) battery cables (BLK). These are factory connected to the battery disconnect circuit breakers located at the left and right sides of the battery tray. Connect one positive (+) battery cable to the positive (+) battery terminal of the second battery. Connect the other pre-wired positive (+) battery cable to the positive (+) battery terminal of the fourth and sixth batteries.
16. Using a torque wrench, tighten all battery hardware per manufacturer's specifications.
17. Install the covers on the batteries.
18. If the cabinet is ready to be placed into service, close all battery breakers.
19. Close the front door.

**Figure 14:** Installing Batteries into a Battery Shelf and Battery Cable Routing

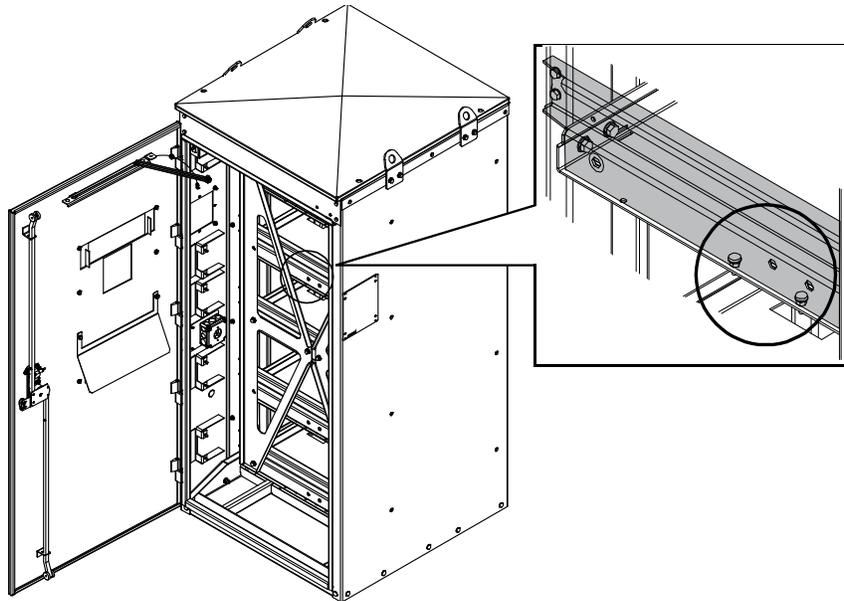


**Figure 15:** Battery Compartment



20. Secure batteries within the battery rack with the previously removed restraint brackets. Battery strings shall be deployed from bottom to top.
- Each EBRE comes standard with additional battery restraint shims, shown in **Figure 16**, for installation of longer, 170A-hr battery blocks. These shims will extend the front of the shelves by .25in.
  - The two sets of fitted hardware assemblies at the bottom center of the restraint bracket are used for securing the bracket to the horizontal plane. Do not remove and use these for securing the battery shelf vertically.

**Figure 16:** Securing the Restraint Bracket in the Horizontal Plane



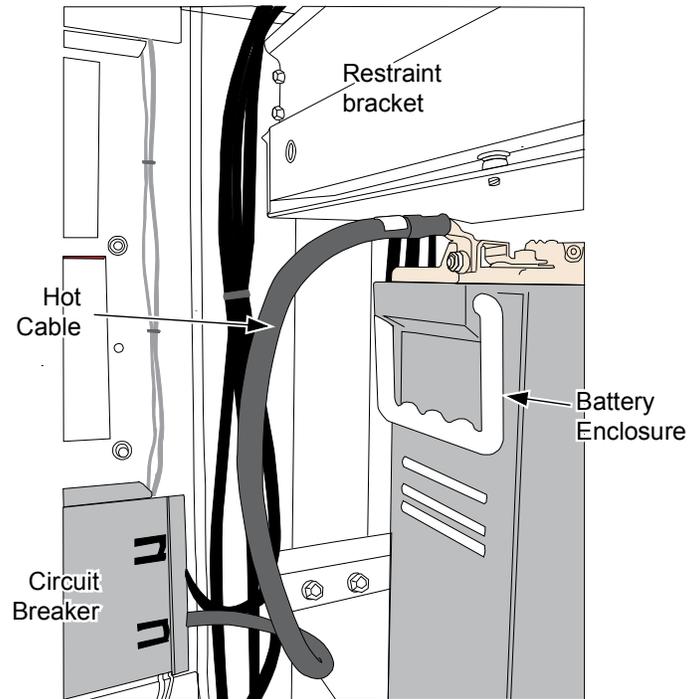
21. Connect the supplied cables from the negative (-) battery bus bar at the top of the battery enclosure to the negative (-) battery terminals of each battery string.



**NOTE!** Connecting the hot (24VDC) cable, however, is different from the return (0 VDC) cable.

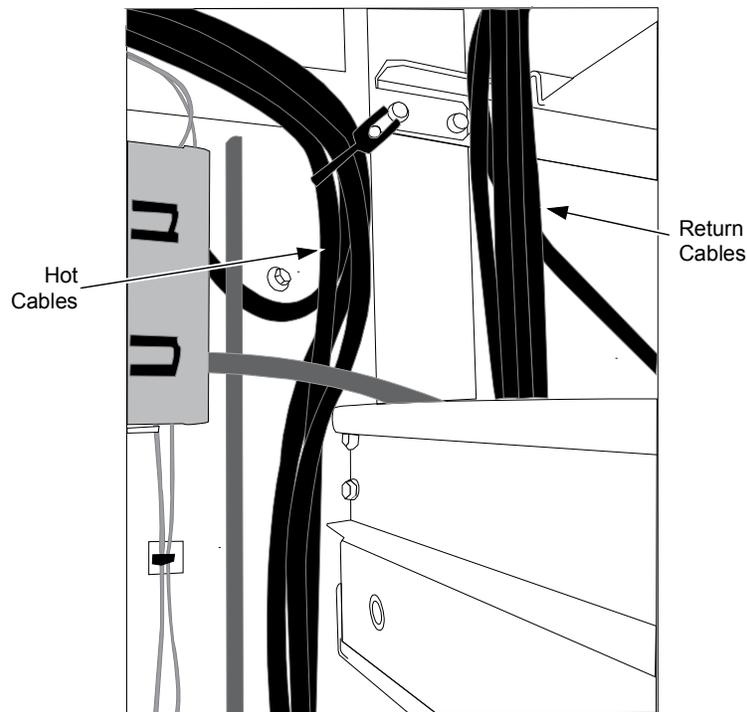
- The hot cable is routed forward from the top of the battery shelf and makes a turn to the side where the circuit breaker is located. See **Figure 17**.

**Figure 17:** Connecting the Hot Cable to the Battery



- The return cable, on the other hand, is routed backwards on the top of the battery, makes a turn to the side in front of the battery shelf or top restraint bracket and goes up the busbars at the top of the enclosure.
- All return cables are routed behind the upright of the enclosure. All hot cables are routed in front of the same upright. See **Figure 18**.

**Figure 18:** Routing Hot and Return Battery Cables



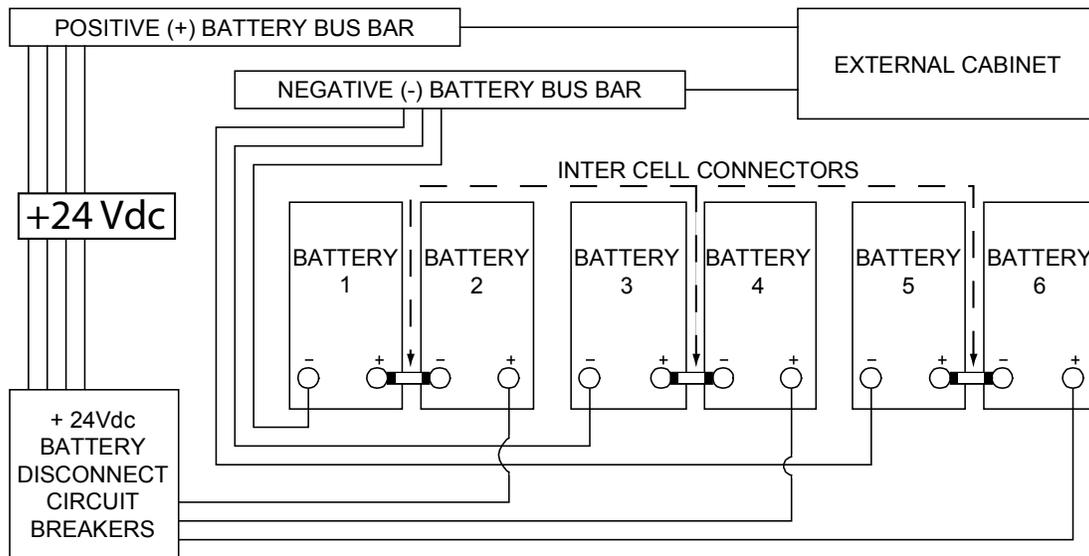
22. Ensure all of the battery disconnect circuit breakers are in the "OFF" position before proceeding to the next step.
23. Connect the supplied cables from the battery disconnect circuit breakers to the negative (-) battery terminals for 24V of each battery string.
24. Using a torque wrench, tighten all battery hardware per manufacturer's specifications.
25. Install the provided battery inter cell connectors to form the battery strings as shown in **Figure 19**.
26. Install the straps and covers on the batteries.
27. Reinstall the front cross braces to the battery retainers.



**NOTE!** These braces, however, are not required in seismic zones 0, 1, and 2.

28. Close the battery compartment door as described in Opening and Closing the Enclosure Doors.

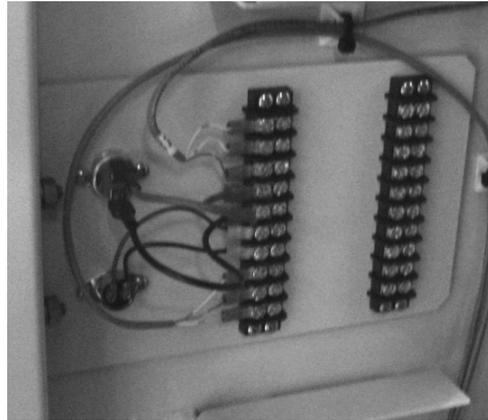
**Figure 19:** Battery Layout Diagram of Battery Strings +24Vdc EBRE



## ALARM WIRING

Alarm is connected to two 10 position screw down blocks (**Figure 20**) located in the battery compartment.

**Figure 20:** 10 Position Screw Down Alarm Blocks



# MAINTENANCE

## Batteries

Inspect the batteries according to battery manufacturer's instructions. Maintain records as required by the battery manufacturer to maintain the battery warranty.

If a battery or batteries need replacement, refer to the instructions in Installing Batteries.

## REPLACEMENT PARTS

Contact Vertiv customer service at 800-800-1280 for information regarding replacement parts and/or accessories.

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