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SolBank
Installation Manual

V1.11

CSI Energy Storage Technologies Co., Ltd.

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1 Preface

1.1 Document Purpose and Scope

The purpose of this document is to provide an overview of the processes and procedures required to install the SolBank Energy Storage System (ESS) (1300V models only). The scope of this manual is limited to only those tasks applicable to installation of this product. Topics covered include, pre-installation inspections and checks; equipment receiving, unloading, and inspections; equipment mechanical and electrical installation; and equipment cleaning and installation inspections.

This manual should be made available to all field personnel participating in the design and installation of the DC SolBank energy storage system.

This manual is to be considered supplemental to project specific design and safety documentation. Please read and understand all aspects of this document prior to initiating SolBank installation.

Should any questions arise, please contact CSI support:

- By telephone at xxxxx
- By email at supportAmerica@csisolar.com

1.2 Applicable Models

This manual covers the following models only:

- CSI-SolBank-S-2967-2h-US
- CSI-SolBank-S-2967-4h-US
- CSI-SolBank-S-2225-1.5h-US
- CSI-SolBank-S-2967-2h-EU
- CSI-SolBank-S-2967-4h-EU
- CSI-SolBank-S-2225-1.5h-EU
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1.3 Reference Documents

The SolBank Installation Manual exists as part of library of product specific documents. Please consult the following documents to ensure a comprehensive understanding of SolBank attributes.

- *SolBank Installation Manual*
- *SolBank User Manual*
- *SolBank Safety Manual*
- *SolBank Maintenance Manual*
- *SolBank Commissioning Manual*
- *SolBank Decommissioning Manual*

1.4 Version Control

This is the initial release of the DC SolBank Installation manual. As part of CSI's continuous improvement process, CSI reserves the right to make technology and document changes. Please contact CSI support to verify this manual reflects the most recent release or to report omissions or inaccuracies.

Version	Description	Date of Issuance
SolBank Installation_v1.0	Initial publication date	2022.1.22
SolBank Installation_v1.1	Format optimization	2022.3.22
SolBank Installation_v1.2	Format optimization	2022.3.23
SolBank Installation_v1.3	DMC cabinet information update	2022.4.24
SolBank Installation_v1.4	Battery cluster to high voltage box power cable connection requirements updated	2022.5.25
SolBank Installation_v1.5	Product information merged; updated fire safety contents	2022.9.04
SolBank Installation_v1.6	Installation process optimization, grounding requirements supplement	2022.12.13
SolBank Installation_v1.7	Optimized installation illustration instructions and product type rules	2023.2.23
SolBank Installation_v1.8	Optimized update of electrical parameters, installation details added，Increased safety testing requirements	2023.10.15
SolBank Installation_v1.9	Corrected enclosure side clearance requirement	2023.11.03
SolBank Installation_v1.10	1. Optimize the insulation detection voltage 2. Added E-stop dry contact description 3. Optimize output cable requirements	2023.11.23
SolBank Installation_v1.11	1. Updated the bolt from M12 to M16 at item 5.6.4; 2. Updated the data of specific SolBank auxiliary power requirements at item 4.5.4 3. Updated the procedure at item 5.4.3; 4. Revised the item 5.6.5 SolBank DC Cable Installation Procedure.	2023.12.26

1.5 Document Safety Notices

Throughout this manual the below indicated Danger, Warning, and Caution labels are used to convey hazards associated with specific tasks and procedures. These safety notices do not represent all hazards present when performing a given task. Installers and operators of the SolBank should adhere to industry safety best practices; site specific Environment, Health and Safety plans; and local safety requirements and regulations. *Only properly trained and qualified personnel should be permitted to complete the installation procedures identified in this manual.*

"DANGER" indicates a hazardous situation which, if not avoided, will result in death or serious injury. The signal word "DANGER" is limited to the most extreme situations. DANGER indicators are not used for property damage hazards unless personal injury risk appropriate to these levels is also involved.

"WARNING" indicates a hazardous situation which, if not avoided, could result in death or serious injury. WARNING indicators are not used for property damage hazards unless personal injury risk appropriate to this level is also involved.

"CAUTION" indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. CAUTION indicators without a safety alert symbol may be used to alert against unsafe practices that can result in property damage only.

1.6 Risk of Electric Shock

The primary risk associated with the installation of the SolBank is electrical shock. *Installation and operational personnel will be exposed to voltages up to 1300 VDC from the SolBank's battery packs.* Battery packs cannot be de-energized. Low and medium voltage AC is also present - exposure levels will depend on site specific conditions. Risk of arc flash and electrocution is omnipresent at an ESS site. CSI encourages full compliance with the practices and procedures indicated in NFPA 70E including use of Personal Protective Equipment (PPE) sufficient to mitigate any hazards identified in a site-specific arc flash study.

Please refer to the remainder of this manual, the documents identified in Section 1.3, and a project/site specific EH&S plan for additional safety hazards.

1.7 Product Certification and Compliance

SolBank is compliant or have referenced following standards, regulations, and requirements identified in Table 1.

Standards	
System	NEC - National Electrical Code® IEC 60529 - Degrees of protection provided by enclosure UL 508 - Standard for Industrial Control Equipment UL 991 - Standard for Tests for Safety-Related Controls Employing Solid-State Devices. UL 1998 - Standard for Software in Programmable Components IEEE C84.1 - Standard Preferred Voltage Ratings for Alternating-Current Electrical Systems IEEE 693 - Recommended Practice for Seismic Design of Substations IEEE 1584-2018 - Guide for Performing Arc-Flash Hazard Calculations Modular Energy Storage Architecture - Energy Storage System (MESA-ESS) Standard
Fire Protection and Safety	NFPA 855 - Installation of Energy Storage Systems NFPA 70E® - Standard for Electrical Safety in the Workplace® NFPA 72 - National Fire Alarm and Signaling Code NFPA 69® - Standard on Explosion Prevention Systems NFPA 68® - Standard on Explosion Protection by Deflagration Venting UL9540A - Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems

Table 1: SolBank Standards Compliance

directory

AC - Alternating Current

AHJ - Authority Having Jurisdiction

BMS - Battery Management System

BOL - Beginning of Life

CSI - CSI Energy Storage as the manufacture of the SolBank product

CSI Personnel - CSI employee or subcontractor as authorized personnel to participate the inspection and commissioning of the SolBank

COG - Center of Gravity

DC - Direct Current

DMC - Distribution Management Cabinet

EMS - Energy Management System as the communication system that controls and monitors the SolBank

EOR - Engineer of Record

ESS - Energy Storage System

EPC - Engineering, Procurement, and Construction contractor

HVAC - Heating Ventilation Air Conditioning

IFC - Issued for Construction

Installer - Installer of the SolBank

LFP - Lithium Iron Phosphate

LOTO - Lock-Out-Tag-Out

NFPA - National Fire Protection Association

PCS - Power Conversion System (Inverter)

PPE - Personnel Protective Equipment

SPD - Surge Protection Device

SolBank Controller - Local controller of the SolBank BMS that communicates with the EMS

UPS - Uninterruptible Power Supply

3 Introduction

3.1 Acknowledgement

Thank you for purchasing the containerized SolBank system supplied by CSI Energy Storage Technologies Co.,Ltd. The SolBank is an advanced modular battery energy storage system incorporating industry leading capabilities enabled by cutting-edge technologies and innovative design. High energy density, liquid cooled battery and power electronics, extended service life, and advanced safety features are just a few of the attributes that set the SolBank apart from other ESS products.

The SolBank is fully factory integrated and tested at CSI's facility, arriving on site with battery racks populated and sub systems installed. This high level of pre-integration results in rapid installation, reduced EPC CapEx, and improved system performance and reliability.

The following document provides an overview of the SolBank system and the installation steps required for successful integration with other system equipment and controls.

3.2 System Overview

The SolBank System integrates all power electronics, controls, and safety features required to support the DC side of a battery energy storage system. An overview of the DC Pro layout and key features is shown in Figure 1-1 and further described in Table 2.

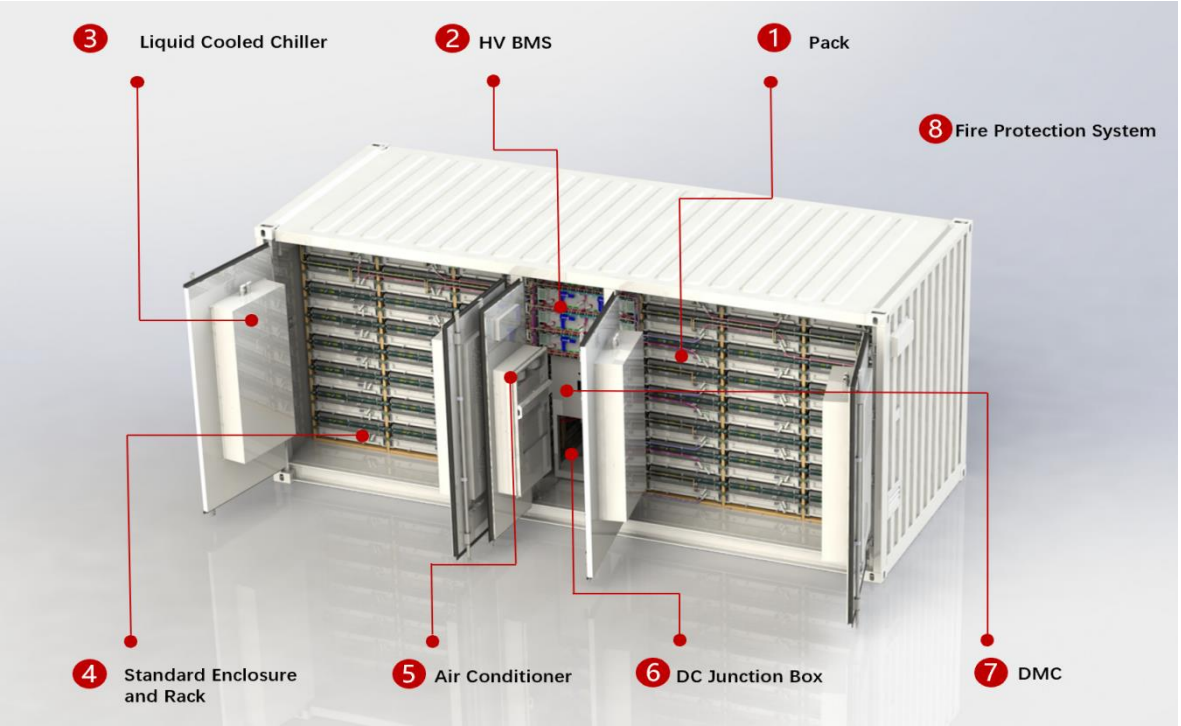


Figure 1-1: Layout and features of the SolBank

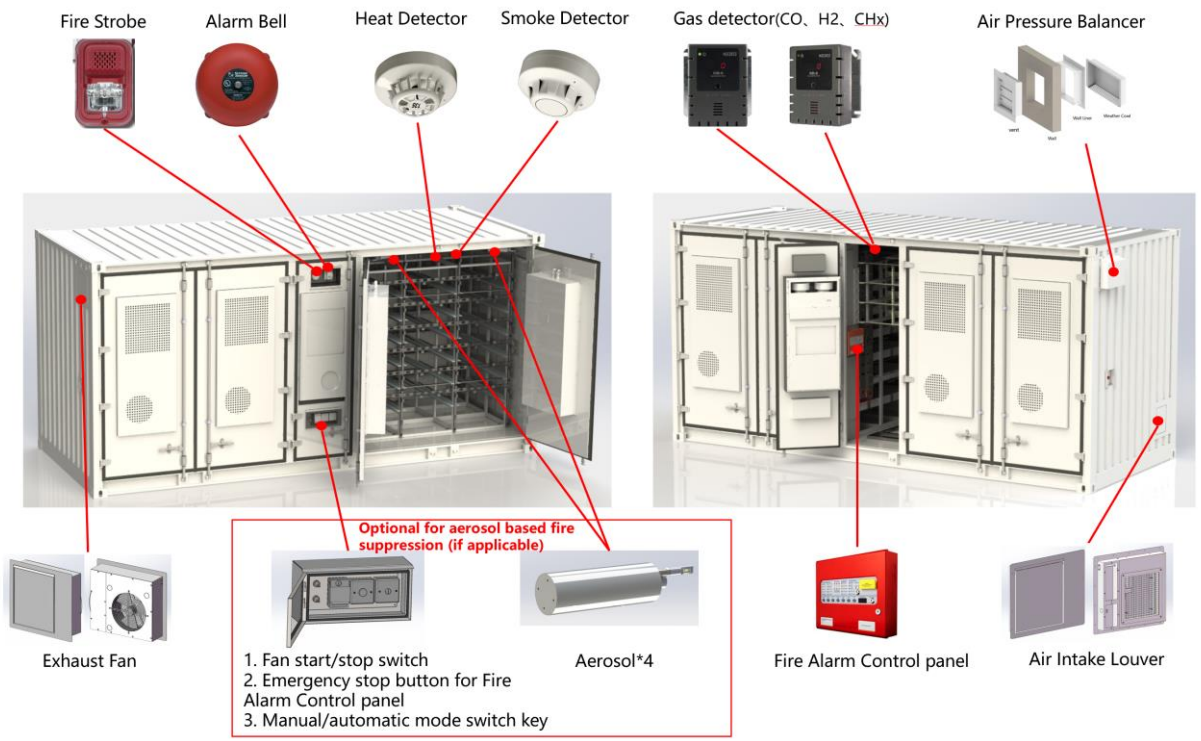


Figure 1-2: Layout and features of the SolBank

[i]*Table 2: Key System Features*

NO.	Name	Remarks
1	Pack	The SolBank contains 48 Lithium Iron Phosphate (LFP) battery packs, each consisting of 69 series wired battery cells.
2	HV BMS	The SolBank contains 8 HV BMS. These are easily accessed for installation and maintenance within the central bay of the container. The BMS ensures optimal battery functionality and safety.
3	Liquid Cooled Chiller	The SolBank's liquid cooling/heating system facilitates improved battery temperature management efficiency relative to traditional forced air systems. Each battery pack is liquid cooled, allowing for greater heat dissipation and uniform cell temperature management. During charge and discharge, cell temperature is maintained between 20°C - 35°C.
4	Standard Enclosure and Rack	All models of the SolBank utilize a standard IP-55 rated 20'ft HC container and battery rack design allowing for enhanced system modularity without increased production and equipment costs.

5	Air Conditioner	The SolBank's Air HVAC is used to control the temperature of the DMC and Junction Box within the 25℃(±3) range, as well as the temperature and humidity inside the SolBank enclosure.
6	Junction Box	The SolBank's DC Junction box contains all primary DC busbar, fusing, Surge Protection Devices (SPD), disconnects, and power monitoring.
7	DMC	The Distribution Management Cabinet (DMC) houses all aux power distribution equipment including 2-hour backup UPS; system communication, control, and monitoring hardware including network switch, and SolBank Controller, and all required customer communication, signal, and aux power interfaces.
8	Fire Safety System	SolBank is equipped with heat and smoke detection for fire alarm system and equipped with explosive gas detection and ventilation for explosion prevention.

3.3 System Specifications

The SolBank system has four models, as shown in Table 3 below. Each model has varying C-rate, power, and energy characteristics. Battery string size, nominal voltages, form factor, and physical dimensions remain consistent across all models. This manual applies only to model

Table 3: SolBank (DC 1324.8V) Specifications.

Item	Parameters		
Discharge Duration	2-hour	4-hour	1.5-hour
Charge/Discharge C-rate	0.5P	0.25P	0.67P
BOL Cell Energy (kWh)	2967	2967	2241
Usable Energy (kWh)	2750	2800	1950
Voltage Range (VDC)	1159.2V ~ 1490.4 V	1159.2V ~ 1490.4 V	1159.2V ~ 1490.4 V
Recommended Discharge Power (kW)	1375	700	1300
# of LFP Battery Packs	48	48	36
# of BMS	8	8	6
Operating temperature	-30°C to 55°C(environmental temperature) 5°C to 45°C (Battery compartment Interior)		

3.3.1 System Dimensions and Weight

SolBank dimensions and weights are shown below. System weights may vary with product characteristics. When purchasing, be sure to verify the design weight and center of gravity (COG) shown in Figure 2 used for the base design and lifting plan. The shipping weight should also be verified prior to completing the lifting plan and initiating the SolBank unloading process. See Section 6 for details.

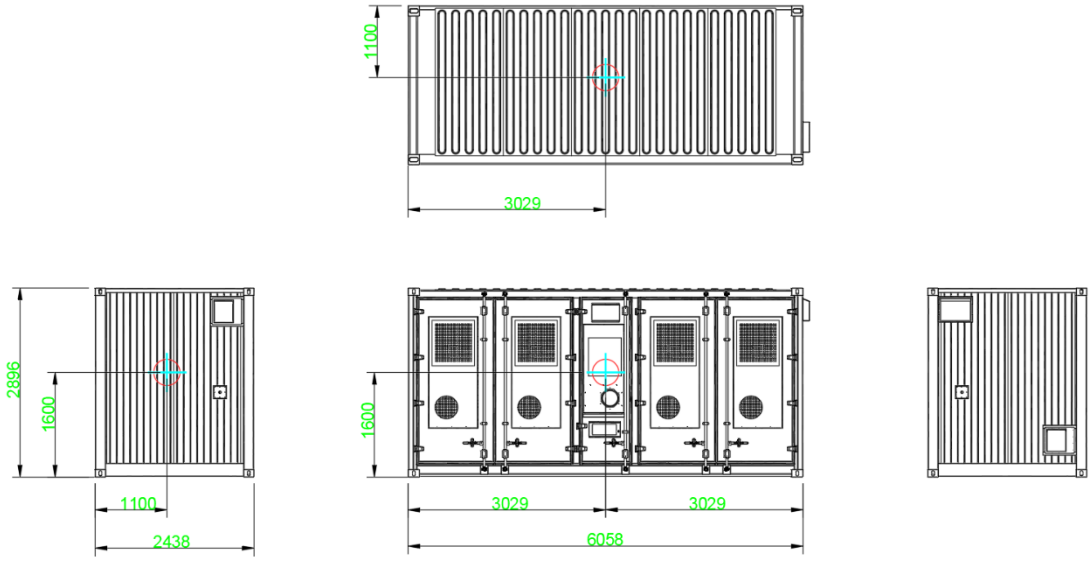


Figure 2 The Center of gravity of SolBank

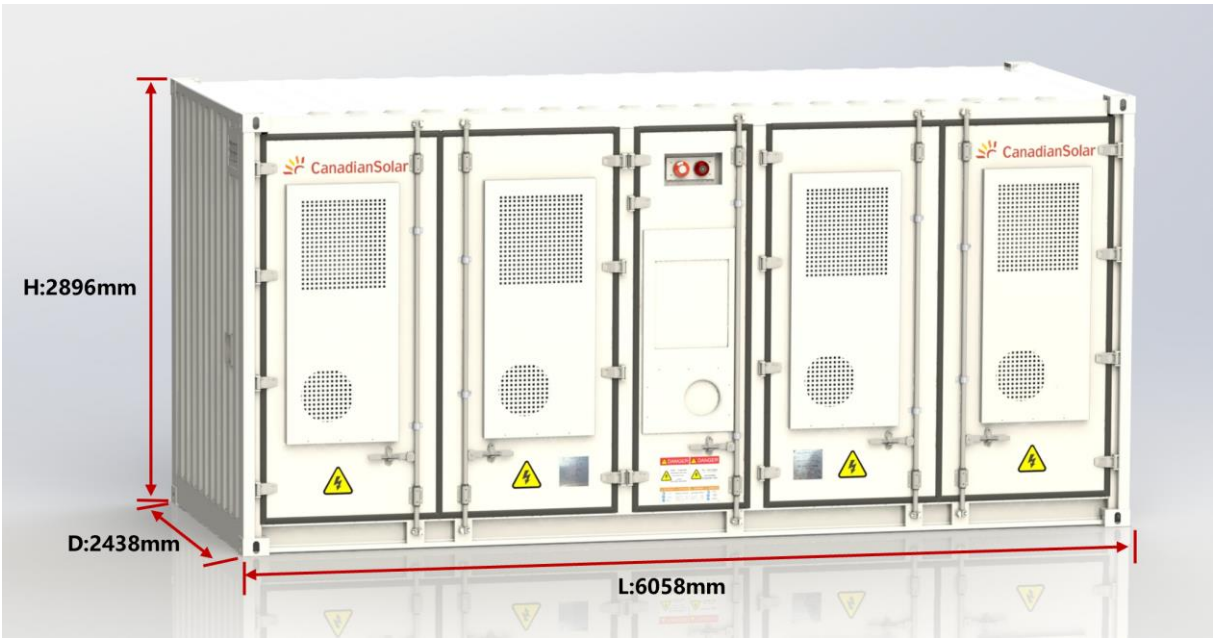


Figure 3 The dimension of SolBank

Product Version	*Length (mm)*	*Depth (mm)*	*Height (mm)*	*Approximate Standard Weight (kg)*
0.25P, 0.5P SolBank	*6058*	*2438*	*2896*	*29,800*
0.67P SolBank	*6058*	*2438*	*2896*	*24,400*

3.3.2 Site Layout and Clearances

The following sections provide guidance on the minimum equipment clearances and displacements required for maintenance and ventilation. Site designers and installers should always consult with the local agency having jurisdiction (AHJ) and fire department personnel regarding applicable codes and regulations, project-specific interpretations of NFPA 855, and other site safety and access considerations. Such project specific restrictions and requirements may increase required clearances beyond those noted below.

The SolBank can be installed as a stand-alone unit or back-to-back with another SolBank, as shown in Figure 4. When mounted back-to-back, the clearance between adjacent SolBank surfaces must not exceed 250 mm (9.8 inches). This dimension is limited by the SolBank attachment hardware ("Bridge lock") used for back-to-back mounting. However, a clearance of 100 mm (3.9 inches) between SolBanks is recommended so that the critical protective packaging remains intact during installation.

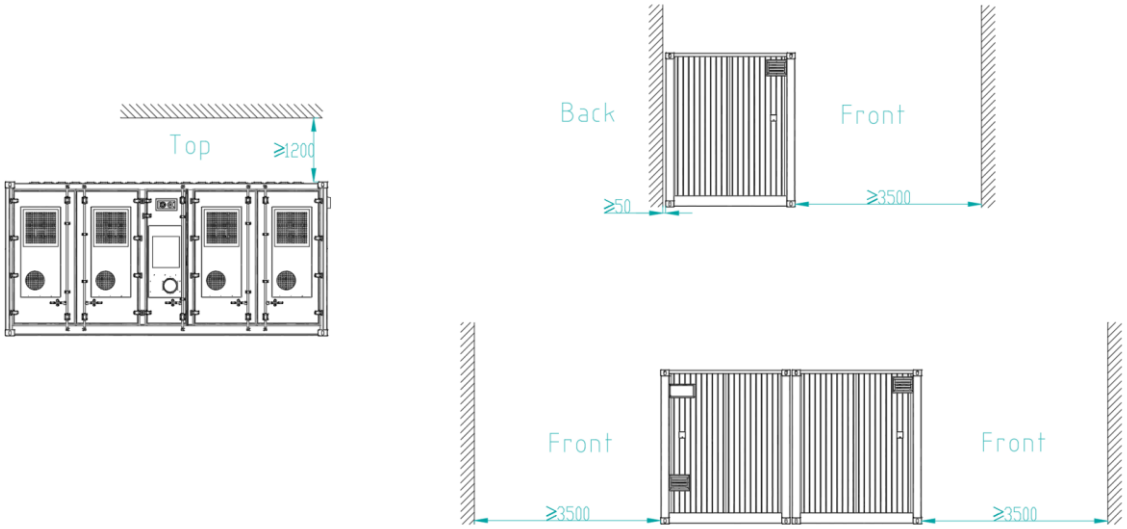
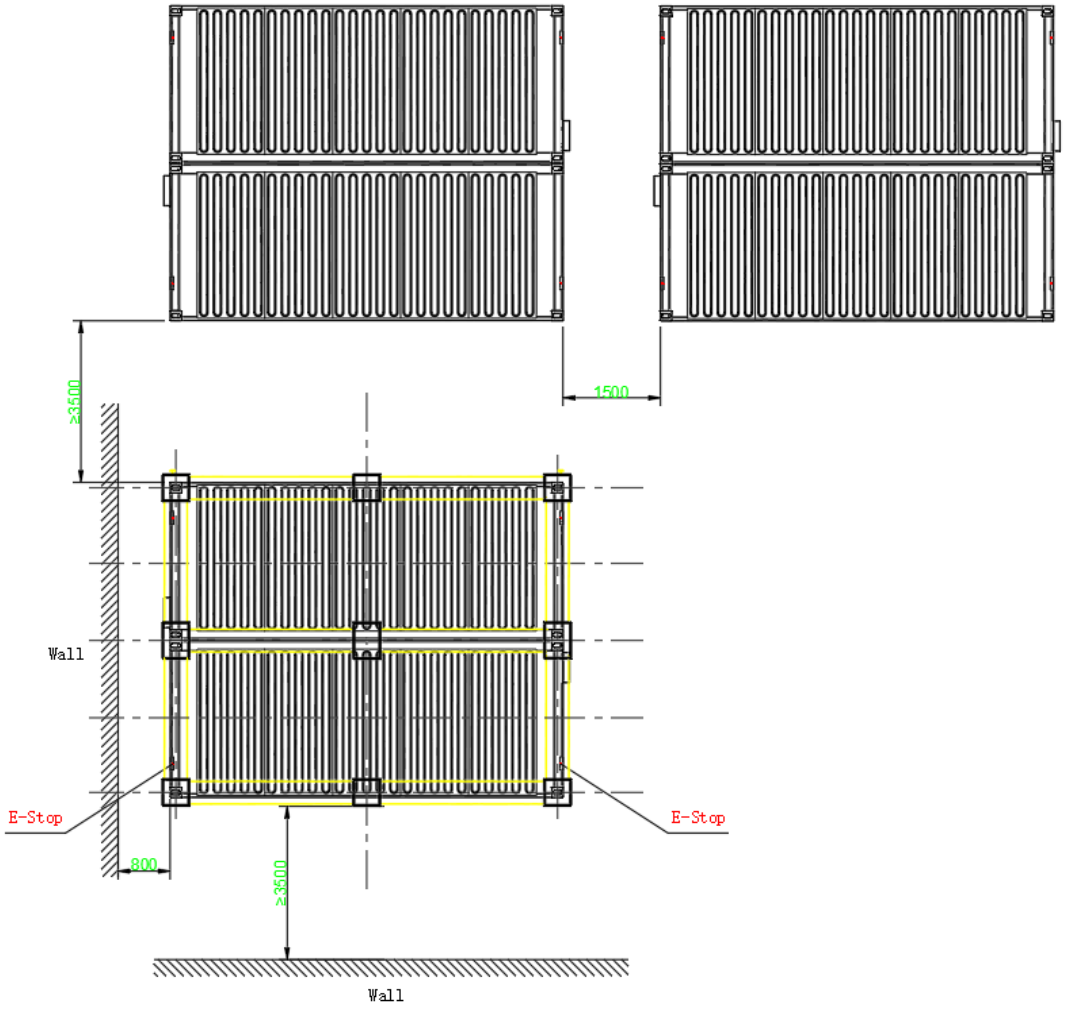


Figure 4: SolBank recommended clearances

The “front” side of the SolBank housing the access doors must always have a clear 3500mm (138”) between the SolBank’s surface and all obstructions. This clearance is required to ensure sufficient space for door swing (1164mm/46”), replacement of battery packs, and movement of equipment and personnel(3180mm/125.25”).



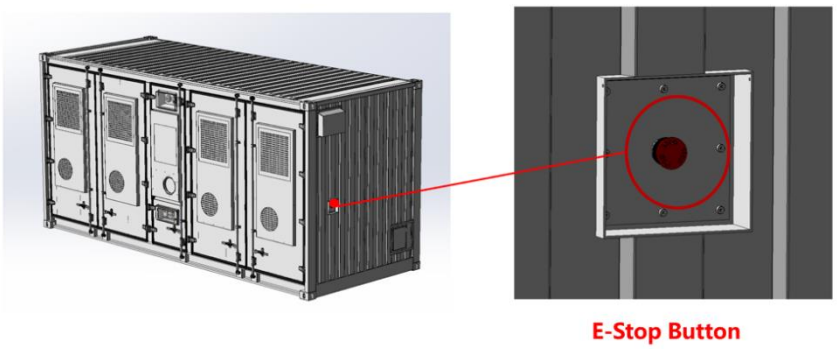


***figure 5**: SolBank Clearances. Back-to-back installation shown left; stand-alone unit installation shown right*

When SolBank are placed side by side, they must maintain a minimum clearance of over 1500mm (58.75”) between them to accommodate emergency stop buttons and maintenance and operating procedures. If installed adjacent to wall, this distance should be increased to 800 mm (31.5”) to accommodate the full swing of the outer access doors. See Figure 6 below.

Above the SolBank, a minimum of 1500mm (58.75”) is required to ensure sufficient space for lifting and positioning.

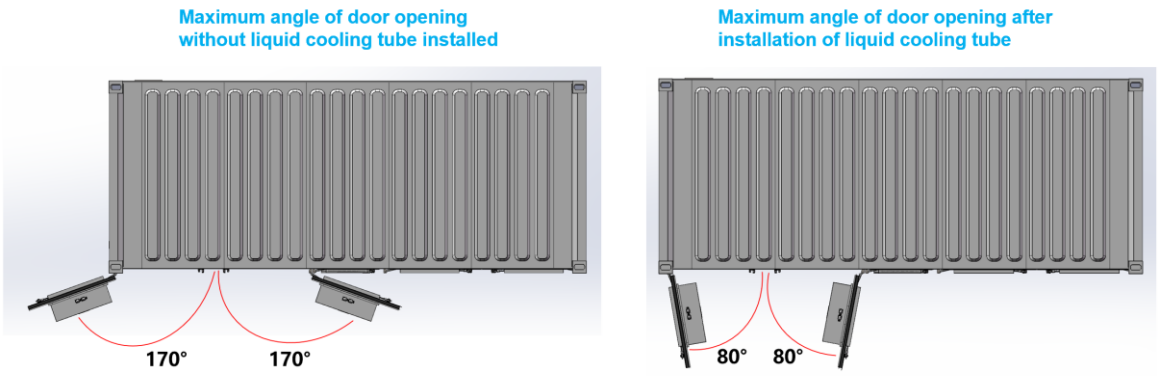


Figure 6: Door swing references without and with liquid cooling tube installed (SolBank arrives onsite with liquid cooling tube installed)

4 Pre-Installation Procedures

4.1 Engineered System Design

The SolBank design has been fully evaluated and optimized by CSI's engineers to ensure safety and performance. Likewise, the integration of SolBank with other key ESS components (PCS, switchgear, transformers, grounding systems, auxiliary power, etc.) required project specific engineering review.

An engineering design package should be completed by an Engineer of Record (EOR) in the state where the project is located prior to the equipment being shipped to the site and installed. This design package should include the complete set of civil and electrical drawings and studies required for a safe, reliable and code compliant ESS installation. All installers should have access to the drawings issued for construction.

All applicable SolBank design documents shall be provided to the EOR prior to the start of the ESS design phase.

Note: If the directions and contents in this manual differ from project specific design documentation, please contact CSI for support and advisement.

4.2 Pre-installation Checklist

Before starting the installation of SolBank, please make sure to review, check and complete the following items. Please note that the pre-installation checklist below may not represent a complete list of all items that need to be checked or completed prior to installing SolBank. The following is provided as general advice only.

4.2.1 Safety

- ☐ All personnel have proper PPE as dictated by the project specific EH&S plan and safety guidance.

4.3 Tools, Equipment and Material Preparation

The following section provides an overview of key equipment and materials that may be required for installation of the SolBank and integration with other ESS equipment at the project site. The items indicated in Table 4 are not included within the SolBank or accompanying Installation Parts and must be procured or obtained separately. Further details regarding equipment and materials are provided in Section 5.5.

Note, Table 4 is provided for planning purposes only and does not reflect all tools, equipment, and construction commodities necessary for a complete installation. Always refer to project specific design documentation for specific details regarding integration of the SolBank with other ESS

equipment and the project specific EH&S plan regarding required PPE.

- Codes and regulations
- A safety briefing is held for the specific installation procedures being undertaken
- All personnel are properly qualified and licensed to perform the installation procedures being undertaken
- A lifting plan has been completed for offloading and placement of SolBank containers and other heavy equipment
- The site is clean, orderly and all hazards have been mitigated to the extent possible and required by law
- All lock-out-tag-out (LOTO) is complete if required
- Working areas have been properly isolated using marking tape, fencing, and signage as appropriate

4.3.2 Site Civil

- Foundations have properly cured
- Foundation dimensions reflect SolBank dimensional requirements and those indicated in the site IFC civil documentation
- Foundation levelness is within required tolerances, The flatness after leveling does not exceed 0.002L
- Power, communication, and signal cable conduit stub-ups are located within required tolerances and properly labeled
- Grounding grid stingers are installed and located within required tolerances and ground grid has been properly tested

4.3.3 Other

- Weather is appropriate for installation procedures
- All required permits and approvals have been obtained
- Equipment siting and clearance requirements identified in Section 4.3.2 are maintained
- Site Auxiliary power distribution equipment has been installed and is energized, or ready to be energized in support of SolBank safety and temperature management systems

Table 4: Recommended installation PPE, tools, equipment, and materials

Item	Remarks
Basic PPE	
Hard hat	To protect head from impacts from falling objects and other hazards
Safety gloves	To protect hands against cuts, abrasion, and other hazards
Safety glasses	To protect eyes from contact with foreign objects and airborne debris
Safety toe boots	To protect feet from heavy objects and equipment
Hearing protection	To protect ears from loud noises generated by machinery and other tools
High visibility vest	To ensure all personnel are seen by equipment operators

Specialty PPE	Arc flash PPE, fall prevention harnesses, and other hazard specific PPE as required by the site conditions and the site EH&S manager or local laws and regulations
First-aid Kit	Basic first-aid kit. To include eye wash station.
Equipment and Tools	
Crane	Crane (and support personnel) meeting capacity and reach requirements as identified in the project specific lifting plan
Forklift	Required for pallet receiving and the movement of equipment and materials around the site.
Roto hammer	Used for drilling anchor bolt holes in foundations
Impact driver & drills	Used for fastener installation and equipment mounting and installation
Wrenches	To include torque wrench. Used for installation of DC cable copper lugs and other equipment.
Wire crimpers	To include appropriate die for all lugs used
Screwdrivers	Used for installation of auxiliary power supply cable and signal wire terminals and other equipment
Multimeter	To include long leads and high DC voltage capability.
Unpacking equipment	Knives, scissors, crowbar, hammer, etc
Ladder	Used to access the roof of the SolBank. Minimum length should be 5M (16.4ft). Ladder should meet OSHA and EH&S plan requirements
Pallet jack	Used for equipment receiving
Portable generator	Used to operate equipment while aux/temp power supply is de-energized.
Key Installation and Integration Materials	
DC Cable	DC conductors connecting the DC Pro to the DC side of the ESS's PCS. To include required lugs.
Auxiliary Power Supply Cable	Conductors connecting the site aux power supply to the aux power terminals of the SolBank. To include required lugs
Communication Cable	Cable facilitating communication between the SolBank, other SolBanks, and the customers EMS (Energy Management System). To include terminations
Signal Wire	Cable transmitting contactor and relay signals between the SolBank, other SolBanks, and the customers EMS. To include terminations
Grounding Cable	Cable connecting a dedicated site grounding grid stinger to the SolBank's ground bus. To include required lugs
Misc items	Shims, cable ties, conduit fittings, duct seal, caulking, labels, and other construction commodities.

4.4 SolBank Receiving and Inspection

This section details initial receiving and inspection processes that must be completed prior to initiation of installation procedures. The SolBank will arrive on site as two separate deliveries. One delivery will consist of the SolBank container itself, and all components within that are factory

installed. The other delivery will consist of Installation Parts as identified in Annex 2. Contact the shipping company to confirm shipping weights prior to equipment arrival and offloading.

4.4.1 Precautions

The SolBank will arrive on site with batteries installed and partially charged. Risk of electrocution exists. Exercise extreme caution.

Equipment may shift during transport and may be unstable. Use caution when approaching and inspecting.

PPE is required when removing equipment packaging. Refer to EH&S plan for task specific requirements.

Forklifts and other heavy equipment should only be operated by qualified personnel with support from spotters and other required support personnel.

4.4.2 Installation Parts Receiving

The Installation Parts inventory consists of equipment, parts, and materials, supplied by CSI, that must be field installed as part of the SolBank installation process. Installation Parts will arrive on site within a wooden crate. This crate should be inspected for signs of damaged prior to being opened. After opening the wooden crate, inspect contents and confirm all items identified in Annex 2 are included within.

If damage is observed, take photos and note specific damage on shipping company's documentation prior to delivery driver leaving the site. CSI is not responsible for shipping damage unless the above steps are completed.

4.4.3 SolBank Receiving

The SolBank will arrive on-site on a flatbed trailer. Upon arrival, remove the protective wrapping to facilitate inspection of the SolBank. Note, Installer may opt to leave other protective elements in place to protect the SolBank during lifting procedures. Proceed with a detailed inspection of the SolBank's exterior, looking for signs of impact with other devices, or other damage resulting from transport stresses.

Under the advisement of the site safety manager, open the SolBank's doors and inspect internal systems for signs of damage. Examine for indications of leaks in the coolant distribution system, damage to racks or other equipment, or shifting of secured items within. Ensure that all doors open and close freely and are fully secured prior to offloading.

If evidence of damage is found do not proceed with offloading the SolBank until first contacting a CSI representative and documenting such damage.

4.5 Other Key ESS Equipment

Operation of the SolBank is enabled via the installation of several other pieces of customer provided key equipment. The spec of such equipment is outside the scope of this manual and should be developed in collaboration with the project EOR and other design personnel to ensure compliance with project requirements.

Provided below is a list of key ESS equipment typically included in traditional ESS architecture and notable requirements for integration with the SolBank. Prior to integrating the SolBank with such equipment, Installer should verify appropriateness of specification.

4.5.1 Power Conversion System (PCS)

A bi-directional PCS (Inverter) is required to facilitate charging and discharging of the SolBank's battery bank. The PCS converts AC power to DC power during charge mode; and DC power to AC power during discharge mode. The PCS should be sized per the model of SolBank installed and the power requirements of the project including any point of interconnection constraints.

Specific SolBank PCS requirements:

1) The DC input voltage range must be wider than that of the SolBank. See Table 3 for further details.
2) The common mode voltage of the PCS DC side should be less than 1500V.
3) The charging current ripple of PCS DC output should be less than 5%, and the charging voltage ripple should be less than 3%.
4) The PCS should be capable of responding to BMS charge/discharge current limiting signals.
5) The PCS must have a capacitor pre-charge circuit.

4.5.2 MV Transformer

A bidirectional step-up transformer must be provided which converts low voltage AC to grid-interconnect voltage (typically medium voltage). The secondaries of the transformer should be connected to the PCS AC terminals, and the primary should be connected to the ESS switchgear.

4.5.3 MV Switchgear

The ESS switchgear typically includes protection and switching equipment required to sufficiently protect both the ESS facility and the grid from faults. Included within are relays, meters, breakers (motorized or non-motorized), fuses and other distribution gear.

4.5.4 Auxiliary Power Distribution

A dedicated auxiliary power feed must be obtained in support of ESS aux loads such as HVAC equipment, controls and communication devices, fire detection and suppression equipment, and other SolBank internal components. Typically, auxiliary power equipment includes a dedicated transformer, metering, power distribution busbar and circuit protection.

Specific SolBank auxiliary power requirements:

0.67P&0.5P UL							
Item	Chiller (three-phase)	Air conditioner (three-phase)	Fire control unit	BMS-BOX	24V power	Control	Fan, louver
Max continue active power(kW)	5.5	3.2	0.48	1	0.02	0.2	0.195
Max continue apparent power(kVA)	5.79	4.27	0.53	1.11	0.02	0.22	0.26
Max current（A）	35.99		2.10	6.36			
Max continue aux Load ratings(kVA)	**29.57**						
0.25P UL							
Item	Chiller (three-phase)	Air conditioner (three-phase)	Fire control unit	BMS-BOX	24V power	Control	Fan, louver
Max continue active power(kW)	5.5	3.2	0.48	1	0.02	0.2	0.195
Max continue apparent power(kVA)	5.79	4.27	0.53	1.11	0.02	0.22	0.26
Max current（A）	20.79		2.10	6.36			
Max continue aux Load ratings(kVA)	**17.99**						
0.67P&0.5P CE							
Item	Chiller (three-phase)	Air conditioner (a-phase)	Fire control unit	BMS-BOX	24V power	Control	Fan, louver
Max continue active power(kW)	5.2	2.4	0.368	1	0.02	0.2	0.195
Max continue apparent power(kVA)	5.47	3.20	0.41	1.11	0.02	0.22	0.26
Max current（A）	33.62	14.75	1.88	7.44			
Max continue aux Load ratings(kVA)	**27.12**						
0.25P CE							
Item	Chiller (three-phase)	Air conditioner (a-phase)	Fire control unit	BMS-BOX	24V power	Control	Fan, louver
Max continue active power(kW)	5.2	2.4	0.368	1	0.02	0.2	0.195
Max continue apparent power(kVA)	5.47	3.20	0.41	1.11	0.02	0.22	0.26
Max current（A）	16.81	14.75	1.88	7.44			
Max continue aux Load ratings(kVA)	**16.17**						

5 Installation

The following sections outline the installation procedures required to fully install and integrate the SolBank into the ESS project site. Figure 7 below provides an overview of the SolBank installation process. These steps must be followed sequentially and be performed by qualified personnel.

During each step of the installation, safety is of paramount importance. Please note all safety hazards described in this section and adhere to the project specific EHS plan.

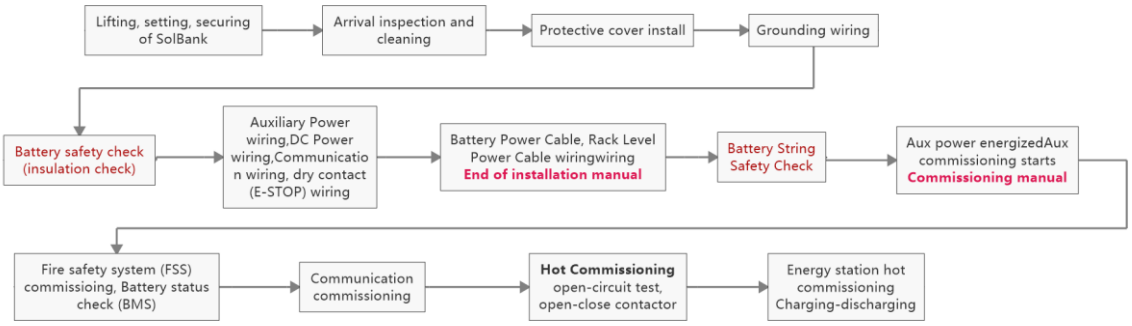


Figure 7: SolBank Installation Process Overview

5.1 Lifting, Setting, and Securing the SolBank

This section details the procedures and tasks required to set and secure the SolBank on site foundations.

5.1.1 Workflow

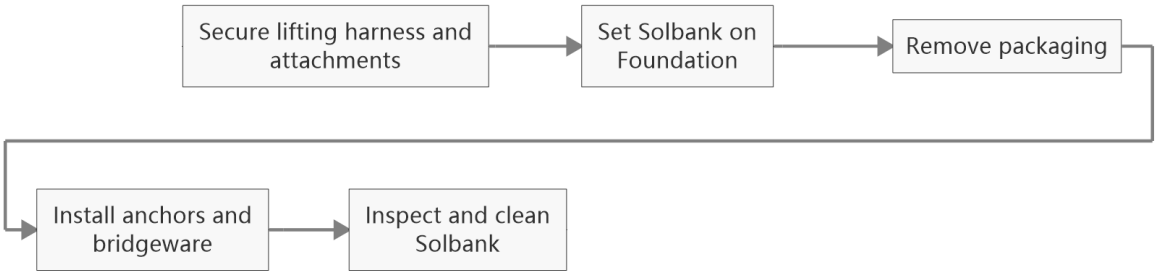


Figure 8: SolBank lifting and placement. Note: Bridge lock indicated in step 5 above only required in back-to-back installations. See Section 6.1.5 below for more details.

5.1.2 Recommended Tools and Equipment

Table 5: Recommended tools and equipment

Name	Purpose	Remark
Bridge lock	Used for connecting adjacent SolBank's when installed back-to-back.	2 pieces per back-to- back installation. Provided by EPC if required
High-Capacity Crane	Used for lifting the SolBank system from delivery truck to foundations	Size to be determined by lifting plan. Dependent on required reach of arm and Other site specifics. Provided by Installer
Concrete Expansion bolts and nuts	Used for anchoring SolBank to foundations	8 pieces per two SolBank for back-to-back installation 8 pieces per SolBank for Stand-alone installation Specification per EOR design Provided by Installer
Roto Hammer	For drilling holes in foundation	Provided by Installer.
Torque Wrench	For securing expansion bolts and Bridge lock	Provided by Installer.
Ladder	For SolBank roof access	Provided by Installer.
PPE	Basic PPE and proper fall protection	Provided by Installer.
Misc items	Other tools and equipment that might be needed for this process	Provided by Installer. Shims, cable ties, conduit fittings, duct seal, caulking, labels, and other construction commodities.

5.1.3 Precautions

The SolBank will arrive on site with batteries installed and partially charged. Risk of electrocution exists. Exercise extreme caution.

All tasks described in this Section must be performed by appropriately qualified personnel.

A task-specific lifting plan must be developed by qualified personnel and reviewed with all participating individuals prior to removing SolBank from the flatbed trailer and setting on foundations. Shipping weight should be used to verify design weight and crane selection.

PPE is required during all stages of this process. Refer to EH&S plan for task-specific requirements.

Forklifts and other heavy equipment should only be operated by qualified personnel with support from spotters and other required support personnel.

When working on top of the SolBank, or other elevated locations, personnel should be equipped with appropriate fall protection.

When working on top of the SolBank, personnel should refrain from stepping on air vents and other sensitive components.

5.1.4 Lifting and Setting Procedure

- ✓ Step 1: Clearly mark on foundations where the SolBank shall be located. Special care should be taken to confirm precise location of conduit stubs and grounding stinger.
- ✓ Step 2: Identify the “front” side of the SolBank (the side with the logo and all access doors) and ensure lift equipment is setup such that the front of the SolBank can be placed in accordance with site design documentation.
- ✓ Step 3: Identify the SolBank identification number and ensure that each SolBank is placed on the appropriate foundation in accordance with site design documentation.
- ✓ Step 4: Attach lifting harness and equipment to the 4 lifting points identified in Figure 9 per the task-specific lifting plan. This lifting plan is to be developed by qualified personnel in collaboration site safety personnel and crane operators.
- ✓ Step 5: Remove from flatbed and set on foundation were indicated by location markings. Take special care to ensure conduit stubs enter the SolBank in the correct location. See Figure 10. Conduits will penetrate special glands in the SolBank which prevent ingress of animals, insects and external debris. Shim as required until level.
- ✓ Step 6: After removing lifting harness, remove all remaining protective packaging and recycle.

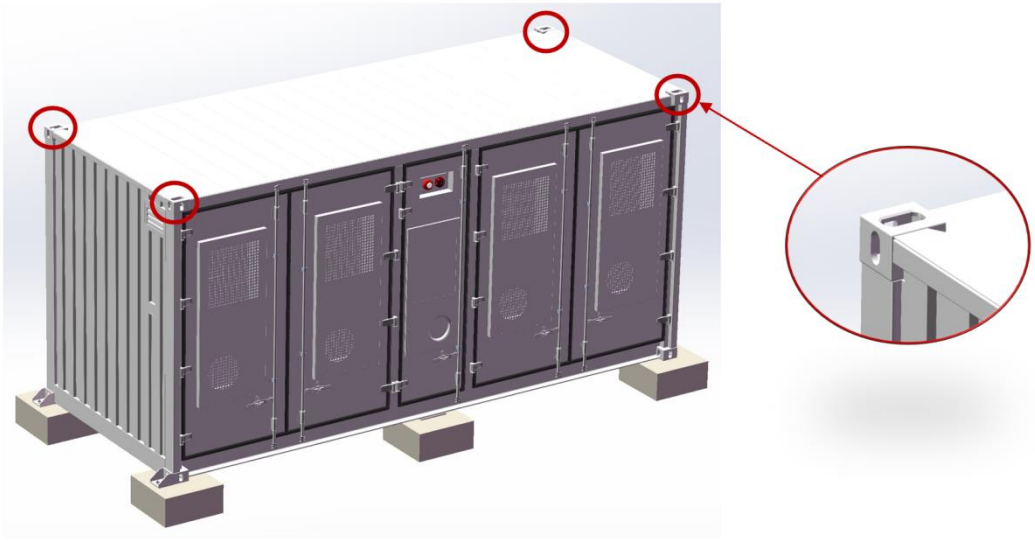


Figure 9-1: Location of SolBank lifting points

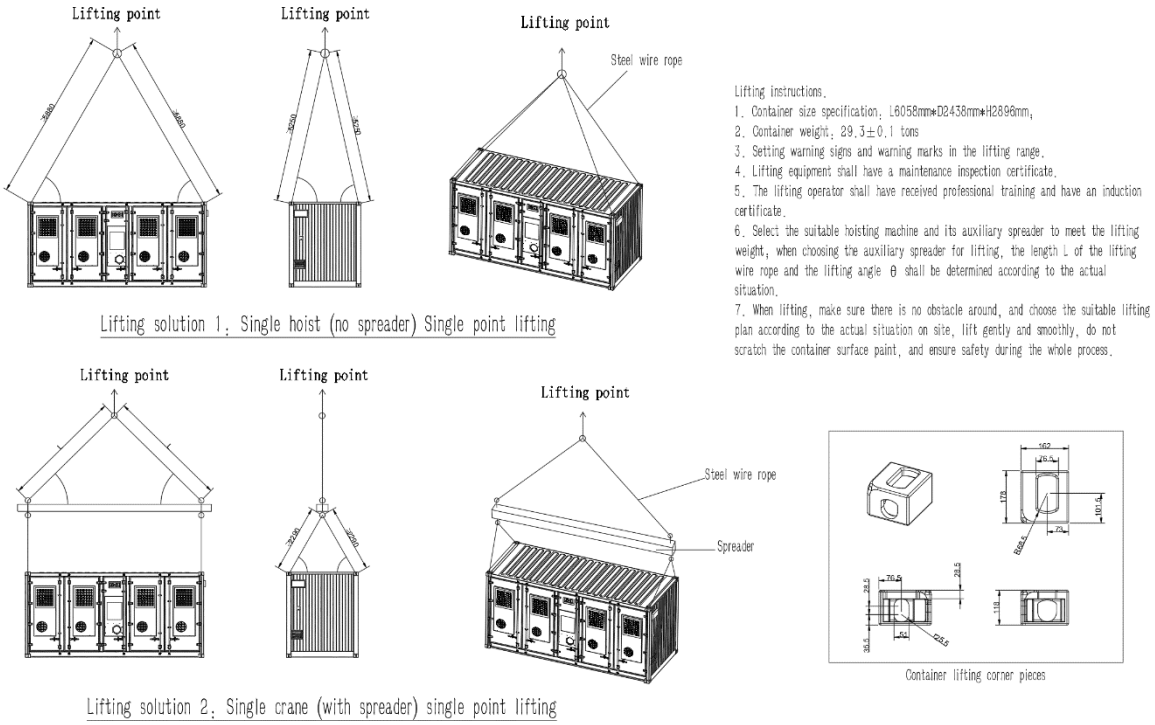
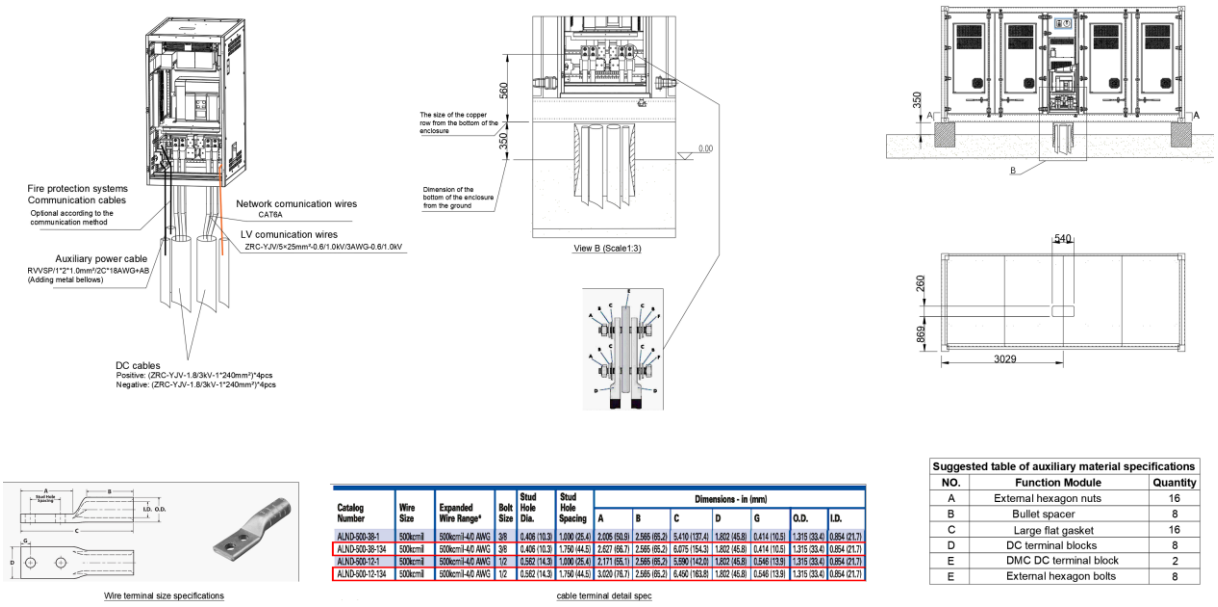


Figure 9-2: SolBank Container Lifting Program

（Before lifting, 15mm steel plate should be placed in advance at the location shown to fill the support gap.）



Wire terminal size specifications

Catalog Number	Wire Size	Expanded Wire Range*	Bolt Size	Stud Hole Dia.	Stud Hole Spacing	Dimensions - in (mm)						
						A	B	C	D	G	O.D.	I.D.
ALND-500-38-1	500kcmil	500kcmil-4/0 AWG	3/8	0.406 (10.3)	1.000 (25.4)	2.005 (50.9)	2.565 (65.2)	5.410 (137.4)	1.822 (45.8)	0.414 (10.5)	1.315 (33.4)	0.854 (21.7)
ALND-500-38-134	500kcmil	500kcmil-4/0 AWG	3/8	0.406 (10.3)	1.750 (44.5)	2.627 (66.7)	2.565 (65.2)	6.075 (154.3)	1.822 (45.8)	0.414 (10.5)	1.315 (33.4)	0.854 (21.7)
ALND-500-12-1	500kcmil	500kcmil-4/0 AWG	1/2	0.562 (14.3)	1.000 (25.4)	2.171 (55.1)	2.565 (65.2)	5.590 (142.0)	1.822 (45.8)	0.546 (13.9)	1.315 (33.4)	0.854 (21.7)
ALND-500-12-134	500kcmil	500kcmil-4/0 AWG	1/2	0.562 (14.3)	1.750 (44.5)	3.020 (76.7)	2.565 (65.2)	6.400 (163.8)	1.822 (45.8)	0.546 (13.9)	1.315 (33.4)	0.854 (21.7)

cable terminal detail spec

Suggested table of auxiliary material specifications		
NO.	Function Module	Quantity
A	External hexagon nuts	16
B	Bullet spacer	8
C	Large flat gasket	16
D	DC terminal blocks	8
E	DMC DC terminal block	2
E	External hexagon bolts	8

Figure 10: Foundation Conduit Stub-ups

5.1.5 Anchoring and Securing Procedure[ii]

✓ Step 1: Secure base of SolBank to foundation using concrete expansion bolts and anchoring hardware as shown in Figure 11 and Figure 12. For back-to-back installation, 8 anchor bolt assemblies are recommended (4 per SolBank). For a stand-alone installation, it is recommended that 8 anchor bolt assemblies also be installed. The EOR shall perform an engineering review of anchoring design to ensure compliance with local AHJ requirements and regional seismic activity. The base of the steel frame structure can also be used for welding and fixing, which needs to be treated with rustproof paint after welding.

Note: Expansion bolts and anchoring feet selected shall be standard parts, and shall be provided and installed by the Installer on site according to the design by the EOR.

✓ Step 2: For back-to-back installations, the top back edge of adjacent SolBanks must be connected at the 2 locations shown in Figure 13 using the Bridge lock hardware shown in Figure 15.

Note: the Bridge lock hardware is designed to accommodate gap between SolBanks that are installed back to back for <250mm (9.8”). bridge lock should be tightened to a torque of 1500 NM. During this step, Installer must not step on top of the corrugated steel plate. Rooftop maximum weight (less than 500 kg per m2).

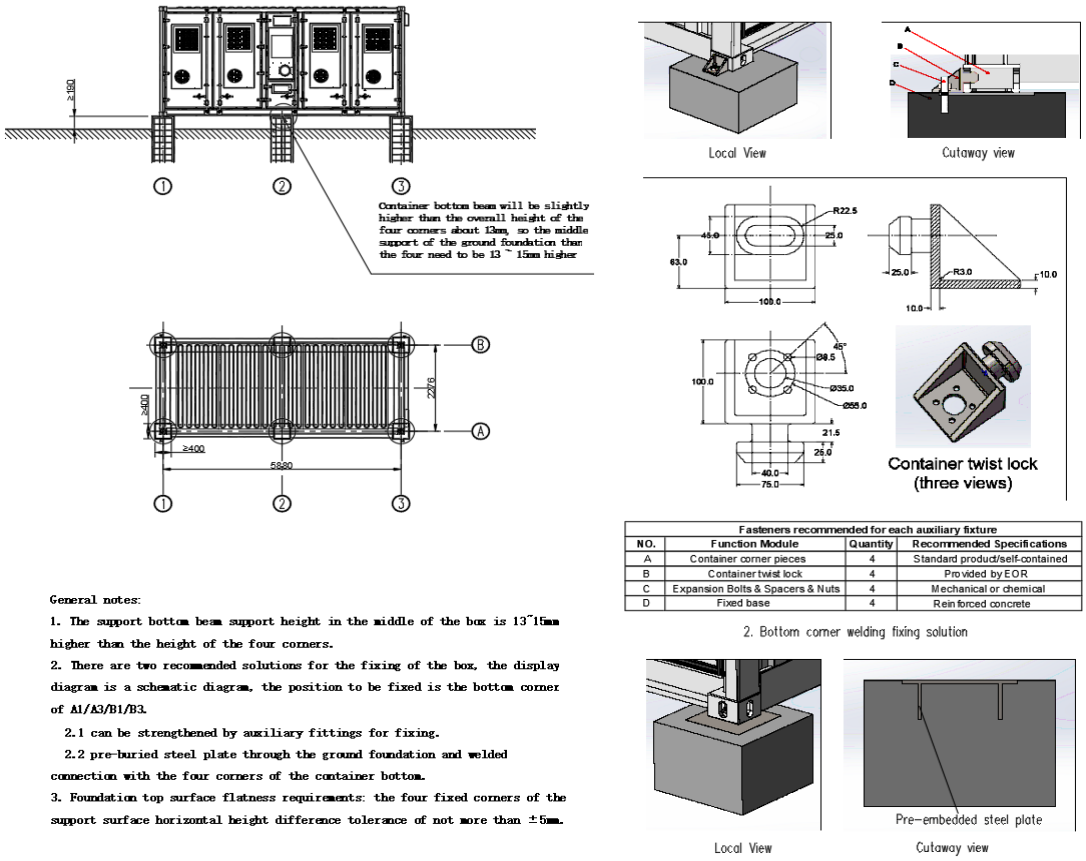


Figure 11: SolBank anchoring in corner position. Refer to details for site specific design by EOR.

（Depending on the PACK removal tooling, the support height can be reduced to 190mm, which needs to be confirmed with CSI.）

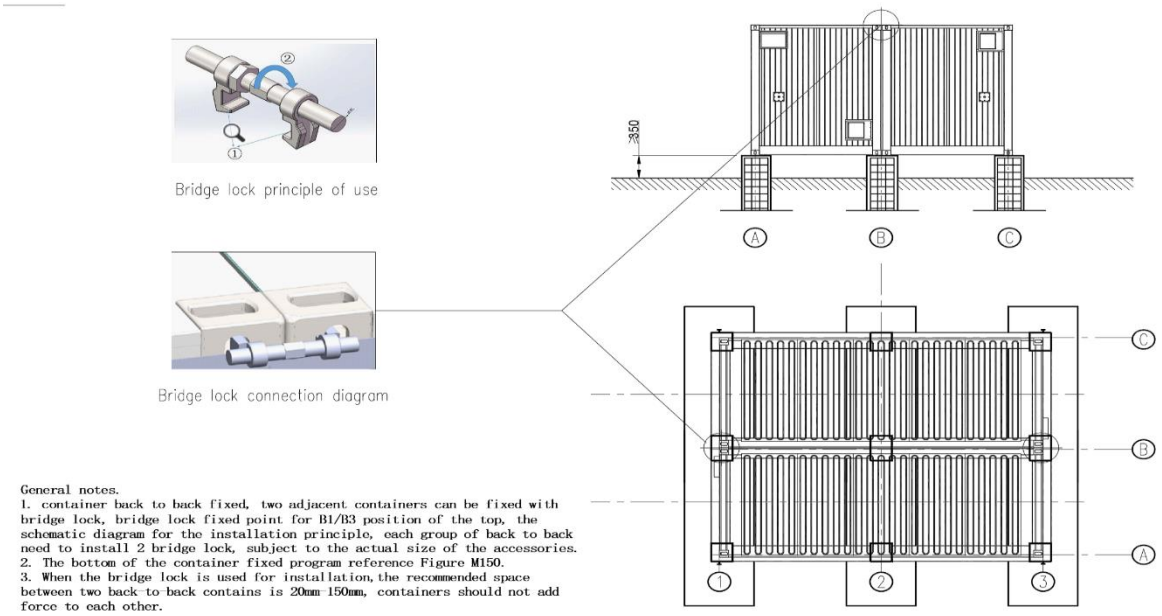


Figure 12: Location of anchoring hardware and Bridge Lock for back-to-back SolBank installation. Refer to details for site specific design by EOR.

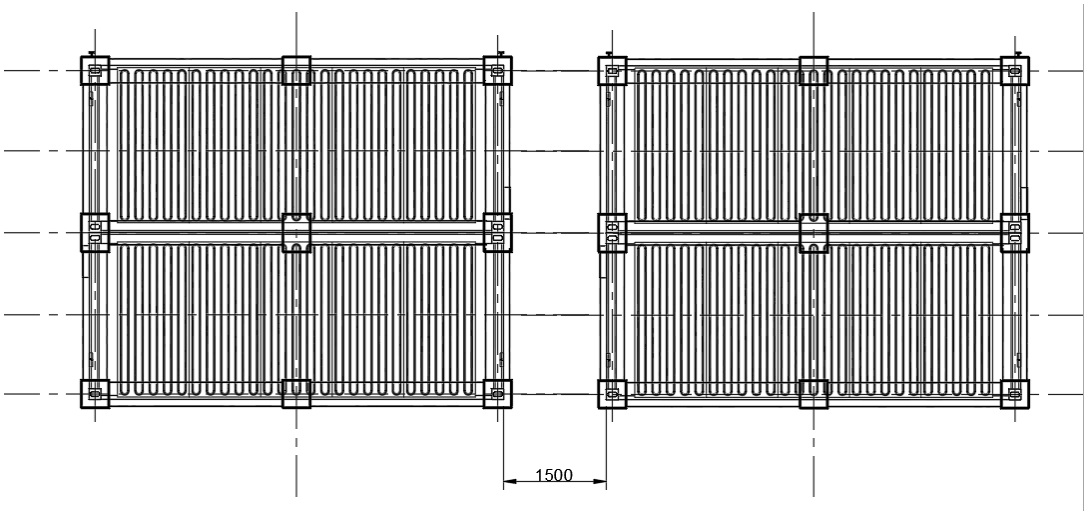


Figure 13: Single SolBank Installation does not require the Bridge Lock hardware. Refer to details for site specific design by EOR.

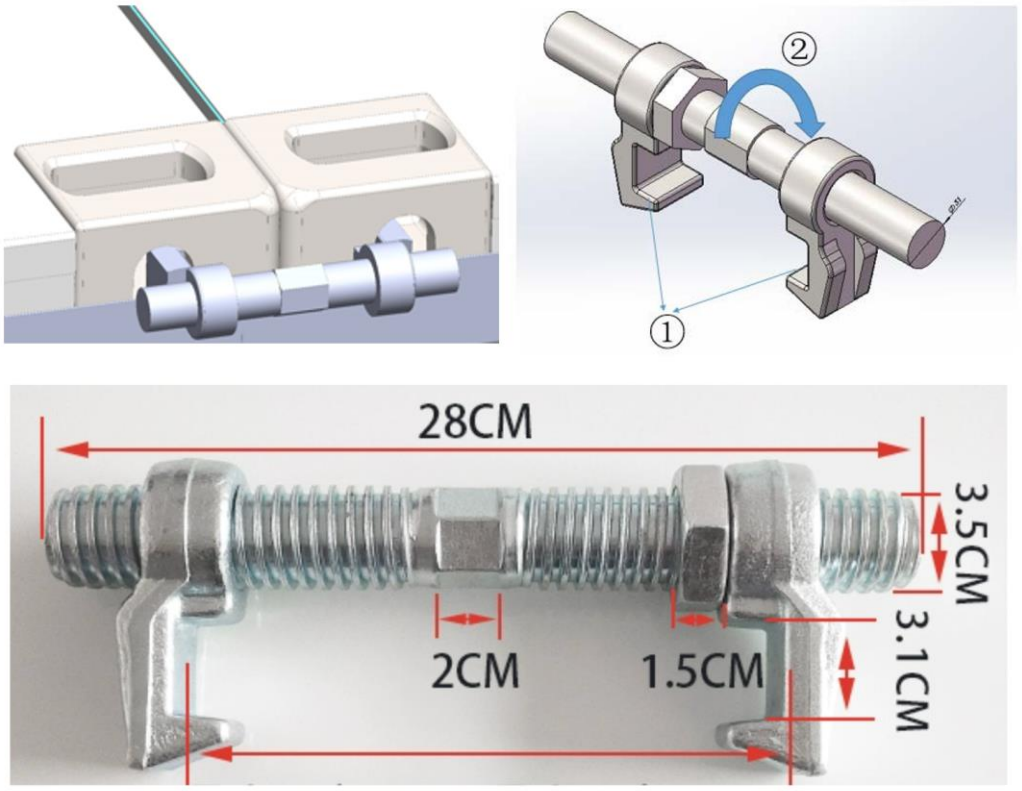


Figure 14: Installation effect of Bridge lock hardware. Refer to details for site specific design by EOR.

5.2 Arrival Inspection and Cleaning

5.2.1 Inspection and Cleaning

After completing the above steps, SolBank should be thoroughly inspected again to ensure that no

damage occurred during transportation and unloading. In addition, dust and debris accumulated during transportation should be removed, especially from areas of the SolBank that are unsafe to handle during operation, if it is safe to do so. Please note that the maximum short-circuit current is 75KA and the recommended minimum protection level is PPE-1. The battery is energized. Use with special care.

5.2.2 Coolant Pipelines Inspection

Special care should be taken during this inspection to ensure no damage to the coolant distribution lines was incurred during transport. The cabinet floor should be inspected for standing liquid or other signs of leaks. Additionally, transport lines should be visibly inspected for the presence of accumulated droplets, kinking, or other damage. Please refer to the *SolBank Coolant Filling Manual* for further details regarding the location and routing of the distribution lines and system pressure gauge.

5.3 Installation of SolBank Protective Cover

This section details the steps required to install the SolBank protective steel plate.

5.3.1 Recommended Tools and Equipment

Table 6: Recommended tools and equipment

Name	Purpose	Remarks
Decorating Plate	Protective cover	1 piece Provided by CSI
M5 Screws	Install the cover plate	9 pieces Provided by CSI
Screwdriver	For M5 screws	1 Provided by Installer
Torque Wrench	For M5screws	1 Provided by Installer
Ladder	For Install the cover plate	1 Provided by Installer
PPE	Basic PPE and proper fall protection	-- Provided by Installer

5.3.2 Precautions

The SolBank will arrive on site with batteries installed and partially charged. Risk of electrocution exists. Exercise extreme caution.

All tasks described in this Section must be performed by appropriately qualified personnel.

PPE is required during all stages of this process. Refer to EH&S plant for task-specific requirements.

Stepping on the roof is allowed for only one person at a time in certain areas. Operators are recommended to install protective cover by using a ladder.

5.3.3 Procedure

- ✓ Step 1: Safely transport materials, equipment, and tools to SolBank roof.
- ✓ Step 2: Install protective cover as indicated in Figure 16 and tighten to a torque of 8.2± 0.2NM.

Figure 15: Protective cover location

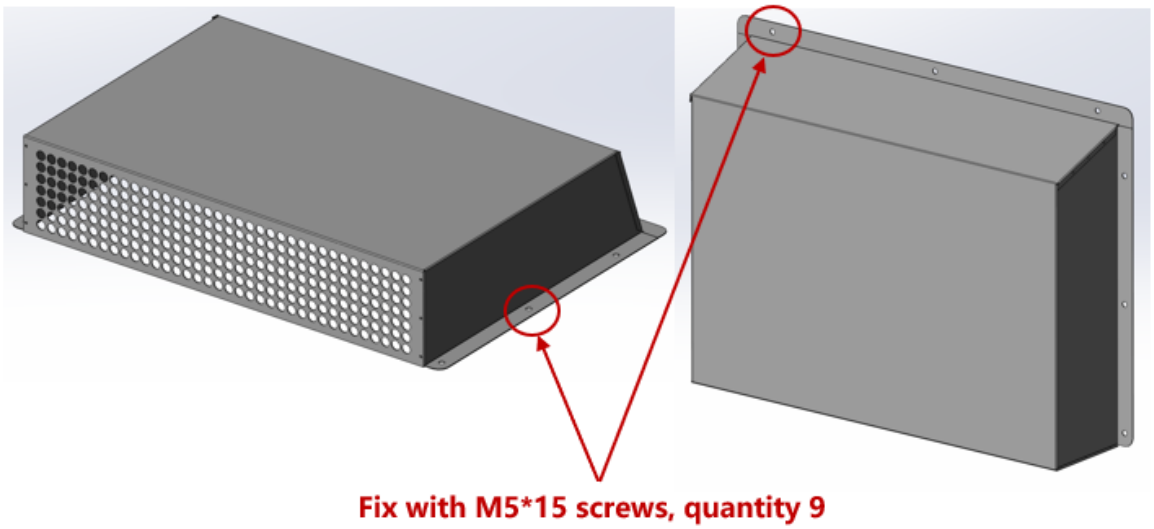


Figure 16: Protective cover installation method

5.4 Firefighting aerosol installation and commissioning (if applicable)

This section details the control cable connection and mounting bracket fixation confirmation at the aerosol at the project site.

5.4.1 Recommended and Equipment

Table 7: Recommended and equipment

Name	Purpose	Remarks
Screwdriver	For M8 screws (Aerosol holder fixation)	Provided by Installer
Wrenches	Wire harness quick connector installation	Provided by Installer
PPE	Basic PPE	Provided by Installer

5.4.2 Precautions

The SolBank will arrive on site with batteries installed and partially charged. Risk of electrocution exists. Exercise extreme caution.

All tasks described in this Section must be performed by appropriately qualified personnel.

PPE is required during all stages of this process. Refer to EH&S plan for task-specific requirements.

5.4.3 Procedure

- ✓ Step 1: Check whether the bolts fixed at the top of the aerosol bracket are loose, and if they are loose, they need to be tightened with the corresponding tools.
- ✓ Step 2: Connect the EXTING wires to the appropriate connector at the Fire Alarm Control Panel(as shown in Figure 18-2), and should be fastened with a screwdriver.
- ✓ Step 3: Adjust the Fire Alarm Control panel cable to manual mode and check whether the equipment is connected properly.
- ✓ Step 4: After passing the self-test, remove the protective pin from the aerosol tail solenoid valve, if not, please consult the operation manual of the gas fire extinguishing mainframe or contact CSI.
- ✓ Step 5: Turn the manual mode of gas fire extinguishing mainframe to automatic mode before the energy storage system is officially put into use.

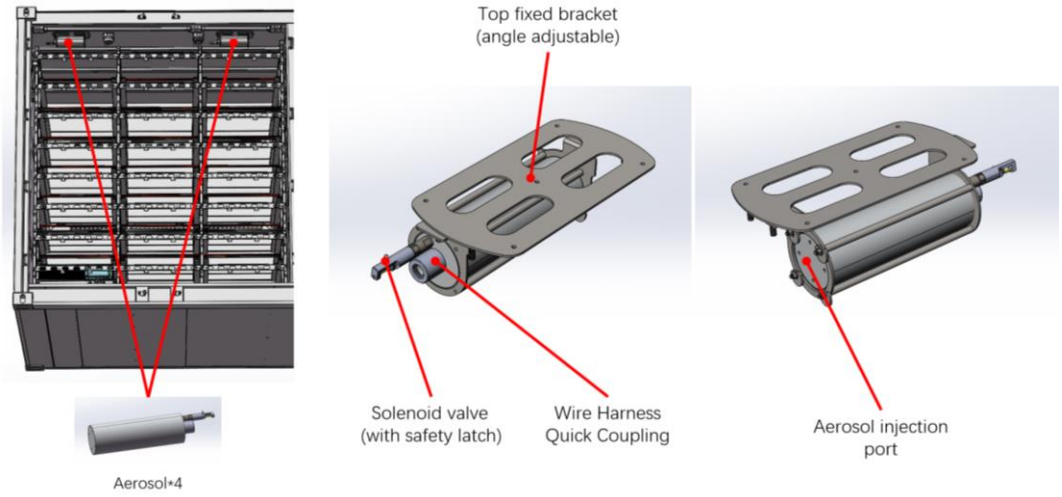


Figure 18-1: Location of aerosol

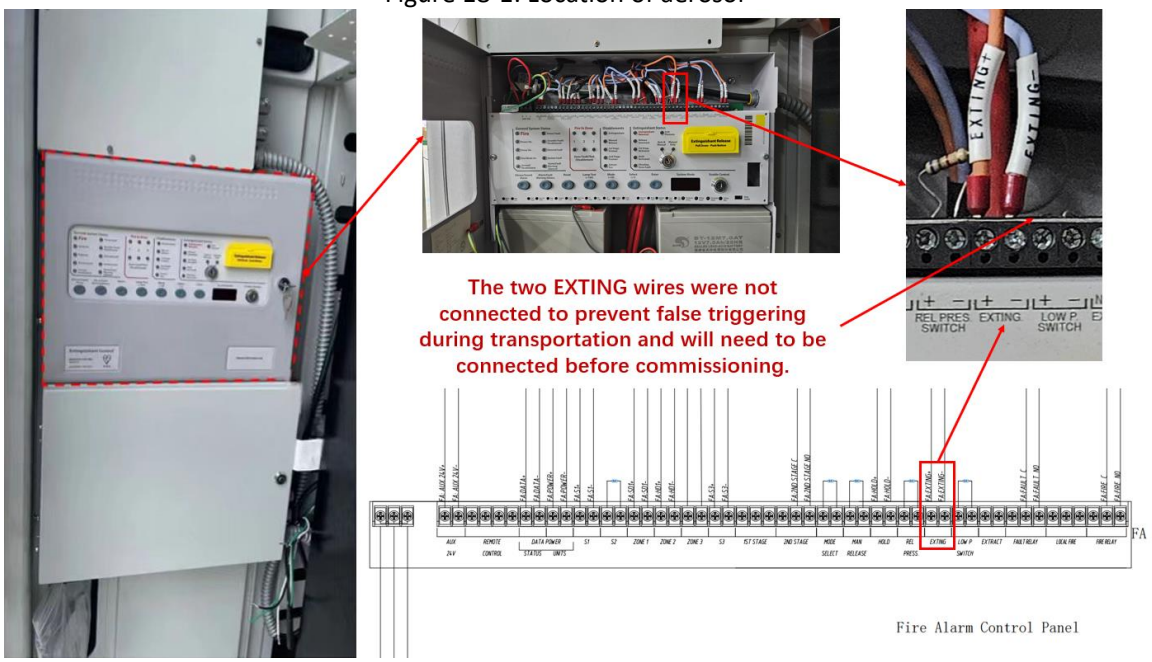


Figure 18-2: Wiring schematic of aerosol

5.5 Fire Alarm Panel Wiring

This section details the fire system panel wiring and networking of different versions of SOLBANK

5.5.1 Recommended and Equipment

Table 8: Recommended and equipment

Name	Purpose	Remarks
Screwdriver	Electrician flat head screwdriver, Phillips screwdriver	Provided by Installer
PPE	Basic PPE	Provided by Installer
SFP Modules and Fiber optic cable	For NCF-1000 NIC networking (for Porter Control Host solution)	Provided by Installer (Select according to the networking method)
Network cable and super category 6 network cable connectors	For NCE-1000 NIC networking (for Porter Control Host solution)	Provided by Installer (Select according to the networking method)
VM100 Input and output modules	For ADVANCED monitoring host networking	Provided by Installer (Select according to the networking method)

5.5.2 Precautions

The SolBank will arrive on site with batteries installed and partially charged. Risk of electrocution exists. Exercise extreme caution.

All tasks described in this Section must be performed by appropriately qualified personnel.

PPE is required during all stages of this process. Refer to EH&S plant for task-specific requirements.

The battery backup for the fire control panel during transportation will be removed and packed separately to avoid unnecessary hazards during transportation. Refer to Figure19-4 & Figure19-5 for the installation location of the battery backup.

5.5.3 Procedure

Wiring and connection of communication cables:

- ✓ Step 1: According to the different communication methods of the fire fighting system, different communication cables and connectors are configured, which can be referred to Figure 19-1 and Figure 19-2.
- ✓ Step 2: Refer to Figure1 9-3 for the communication cable path to place the cable and complete the wiring

Wiring and connection of communication cables:

Battery backup wiring:

- ✓ Step 1: First remove the battery from the package and complete the series wiring of a

set of terminals of two batteries according to Figure 19-4 and Figure 19-5. You can refer to Figure 9-4 for Potter system and Figure 19-5 for Kentec system.

- ✓ Step 2: Place the battery into the fire control panel, and the ± pole of the control panel according to the battery electrode schematic to complete the connection of the remaining set of terminals, you can identify the color of the terminals to assist in distinguishing the positive and negative poles.
- ✓ Step 3: After completing the wiring for power supply, the fire control panel will enter the charged state and can be connected to the utility power supply after confirming that no other detectors have alarm signals.

Figure 19-1: Kentec Fire Control Panel Communication Wiring Position

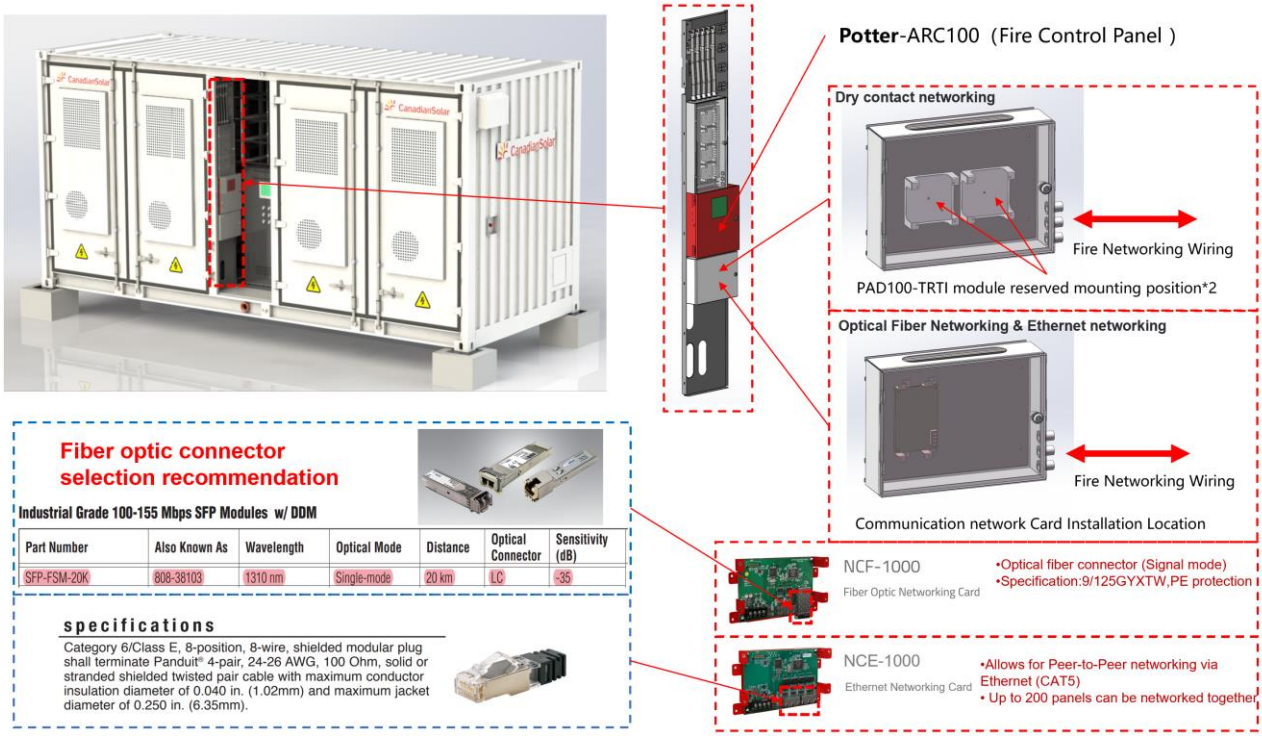


Figure 19-2: Potter Fire Control Panel Communication Wiring Position

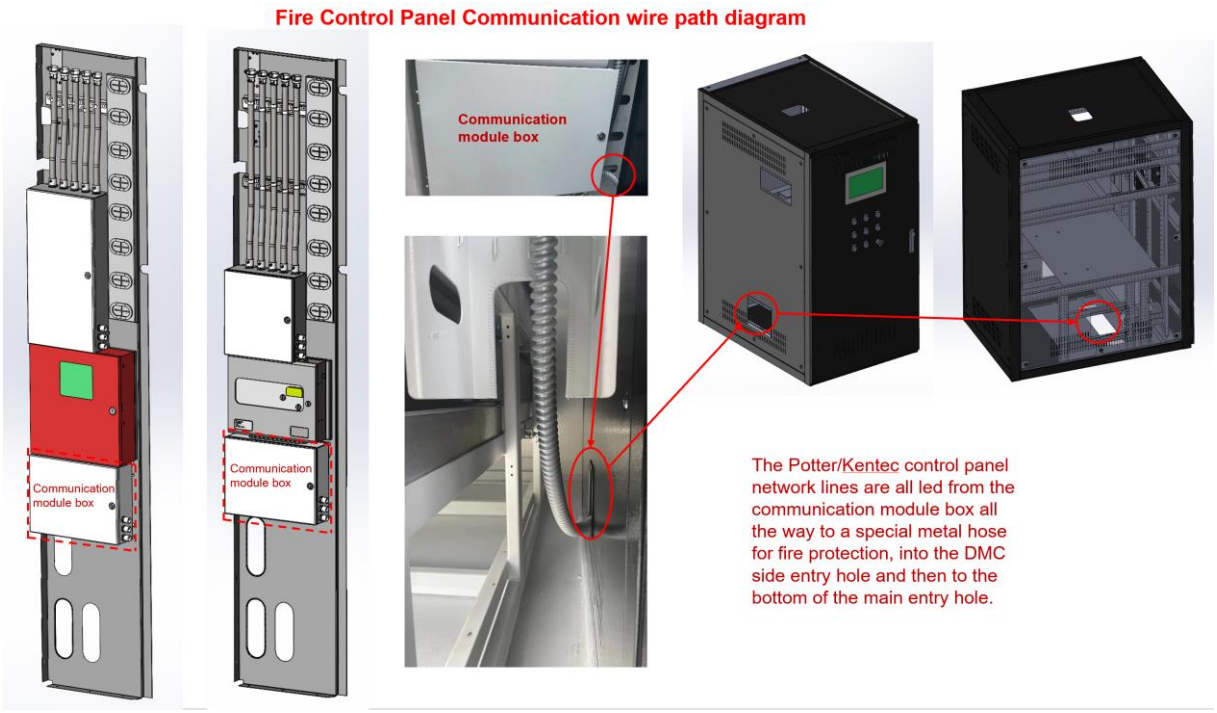


Figure 19-3: Fire Control Panel Communication wire path diagram

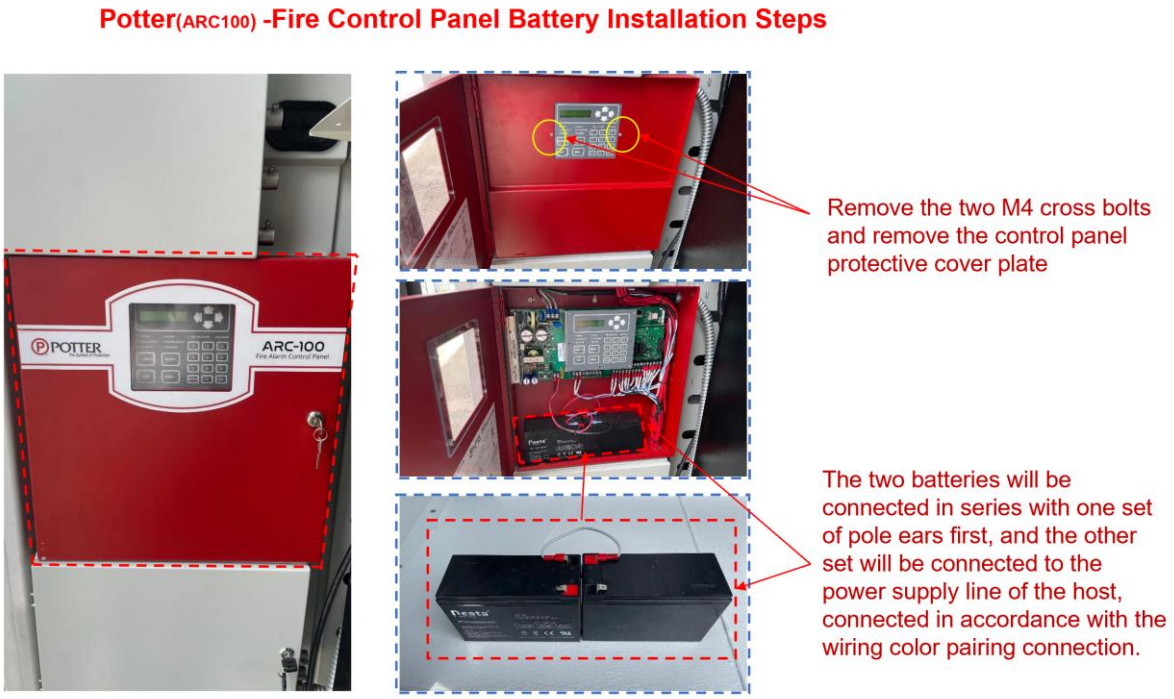


Figure 19-4: Potter Fire Control Panel Battery Backup Wiring

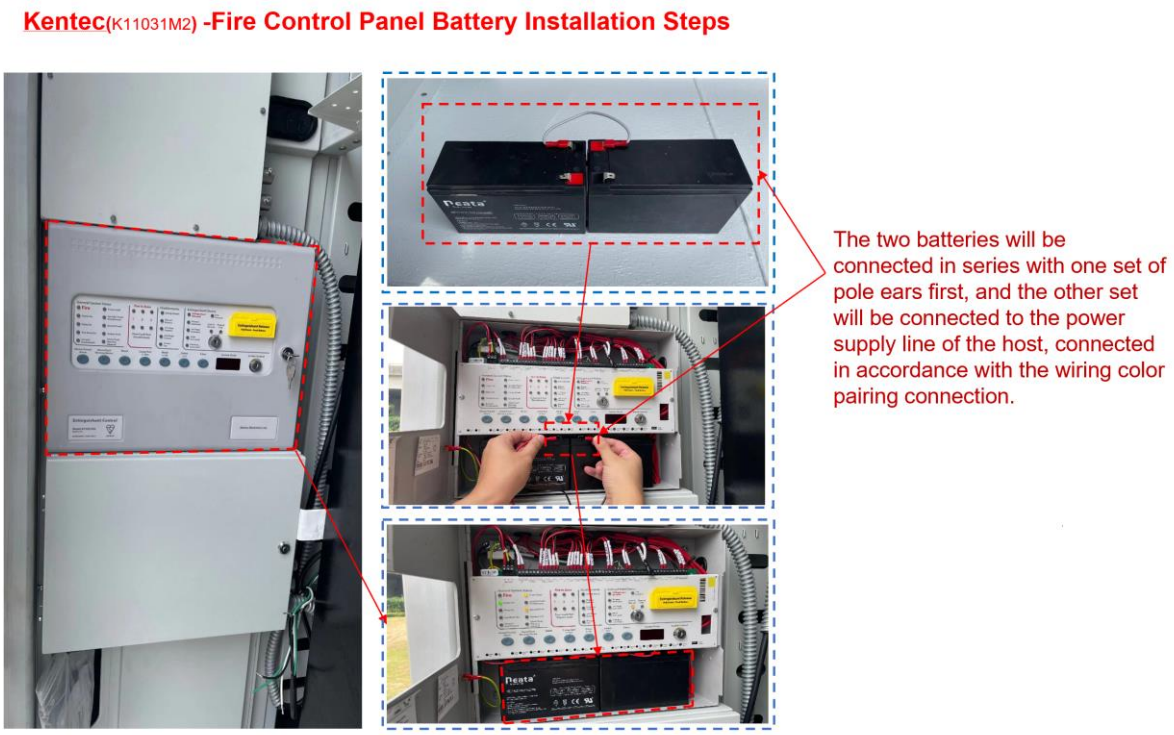
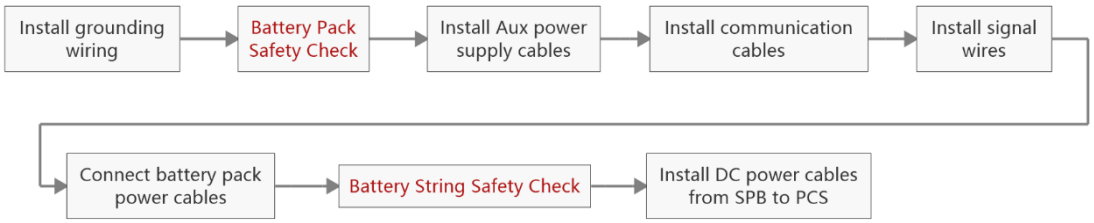


Figure 19-5: Kentec Fire Control Panel Battery Backup Wiring

5.6 SolBank System Wiring

The following section details the field wiring procedures required to electrically integrate the SolBank.

5.6.1 Workflow



✓ *Figure20: SolBank System Wiring (Suggested installation order)*

5.6.2 Recommended Tools and Equipment

Table 9: Recommended tools and equipment

Tool Name	Quantity	Remarks
Cable pulling equipment	--	Used to pull cable through underground conduit
Crimpers and proper dies	--	Used for crimping lugs
Wrenches	--	Used to install lugs onto busbar
Torque wrench	--	Used to tighten terminations to required torque

Basic electrical tools	--	Required for wire prep and installation
Power and communication cable	--	As specified in each subsequent section
Termination lugs and hardware	--	As specified in each subsequent section
Threading board	1	Placed inside container
Misc. construction commodities		Electrical tape, wire labels, duct seal, cable ties, etc.
PPE	--	Basic PPE and specialized electrical PPE per site specific EH&S plan

5.6.3 Precautions

The SolBank will arrive on site with batteries installed and partially charged. Batteries cannot be deenergized. Although the battery packs will not be electrically interconnected, risk of electrocution exists. Exercise extreme caution.

High DC voltage present. Properly rated insulated gloves, insulated footwear, insulated tools, arc flash clothing, and face shields are recommended when working around batteries and energized circuits.

Ensure DC Disconnects are open and battery strings are isolated from PCS when working on system.

Always employ proper lock-out-tag-out (LOTO) procedures as applies when on circuits or equipment that have the ability to be energized.

All tasks described in this Section must be performed by appropriately qualified personnel.

Always ensure correct polarity and prevent shorts against rack frames and other grounded devices.

PPE is required during all stages of this process. Refer to EH&S plan for site-specific requirements.

Always label conduits, cables and circuits according to polarity and project labeling requirements.

Do not modify the outer enclosure of the SolBank. All cables must enter the SolBank as specified and not through custom knockouts. Modification of SolBank without prior CSI approval may result in loss of warranty and certification.

Communication cables shall not be placed in the same conduit as power cables unless shielded. Non-shielded communication cable must be separated from power cable by greater than 0.5M (1.64').

Upon completion of wiring, all conduits and points of cable entry must be closed off with duct seal other preventative measure to prevent ingress of animals and insects.

5.6.4 SolBank Grounding Procedure

Table 10: Required Materials

Item	Requirements	Remarks
Pre-embedded grounding row	Pre-embedded grounding row needs to be reserved according to the box layout and related civil construction	Provided by EOR
Grounding lug and hardware	Double-hole copper lug and M16 bolt and hardware.	Provided by Installer

- ✓ Step 1: Ensure a safe working environment by consulting with the site safety manager.
- ✓ Step 2: Solbank grounding auxiliary material size needs to be configured according to the box stainless steel grounding row and fixing bolt size, as shown in Figure 21.
- ✓ Step 3: Each SolBank is equipped with 4 grounding points, and at least one pair of diagonal grounding points (set 1 or set 2) is required for installation, as shown in figure 22 below.

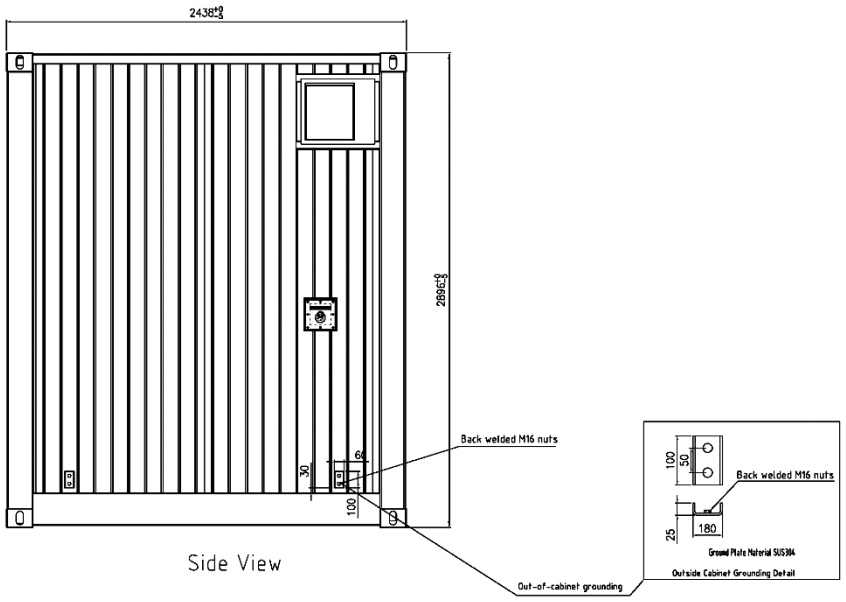


Figure 21: SolBank grounding specifications detail drawing

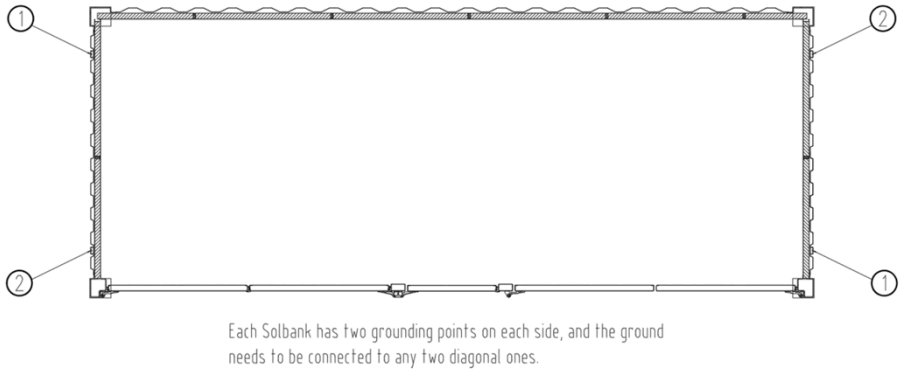


Figure 22: SolBank grounding location diagram

5.6.5 SolBank DC Cable Installation Procedure

Table 11: Required Materials

Item	Requirements	Remarks
Power Cables-0.5P	Cable size, type, length, and count to be specified by the EOR. CSI's recommended cable type is straight-through copper cable not less than 474.4 kcmil (240mm²)*4(per pole). Please contact CSI if you plan to use other cable types/sizes. PS: The diameter of a single cable is not more than 600kcmil Current Calculation: The rated charge and discharge power of the overseas 0.5P system is 1375kW. Maximum power is 1375*1.2=1650kW., Maximum current of the system: 1650kw*1000/414/2.8 =1425A., Average current to each cable is: 1425A/4=356A. A single cable is not less than 474A (356/0.75)	Provided by Installer
Power Cables-0.25P	Cable size, type, length, and count to be specified by the EOR. CSI's recommended cable type is straight-through copper cable not less than 474.4 kcmil (240mm²)*2(per pole). Please contact CSI if you plan to use other cable types/sizes. PS: The diameter of a single cable is not more than 600kcmil Current Calculation: The rated charge and discharge power of the overseas 0.25P system is 700kW.	

	Maximum power is 700*1.2=840kW., Maximum current of the system: 840kw*1000/414/2.8 =724.6A., Average current to each cable is: 724.6A/2=362.3A. A single cable is not less than 483A (362.3/0.75)	
Power Cables-0.67P	Cable size, type, length, and count to be specified by the EOR. CSI's recommended cable type is straight-through copper cable not less than 474.4 kcmil (240mm²)*4(per pole). Please contact CSI if you plan to use other cable types/sizes. PS: The diameter of a single cable is not more than 600kcmil Current Calculation: The rated charge and discharge power of the overseas 0.5P system is 1300kW. Maximum power is 1300*1.2=1560kW., Maximum current of the system: 1560kw*1000/414/2.8 =1345A., Average current to each cable is: 1345A/4=336.3A. A single cable is not less than 448A (336.3/0.75)	
Isolated cable lugs and hardware	Single-hole copper lug and M12 bolt and hardware.(Designed to connect when applicable)	Provided by Installer

- ✓ Step 1: Ensure a safe working environment via consult with site safety manager.
- ✓ Step 2: If not pre-installed prior to SolBank placement, then pull DC power cables from PCS cable termination compartment to SolBank through pre-installed conduits. Cables should enter SolBank at the locations shown in Figure 24.
- ✓ Step 3: Route cables to termination bus shown in Figure 23. Take special care to ensure correct polarity. Label cable as required.
- ✓ Step 4: Cut to length, install lugs, and terminate to bus. Please refer to Figure 25-1 for hardware assembly.
- ✓ Step 5: Reinforcement of the installed cable is fixed to the fixing bracket to ensure that there is no tension on the copper rows when the cable is suspended, refer to Figure 25-2 for illustration to complete the installation.
- ✓ Step 6: Secure power cables.

（**Caution:** In the case that more than one SolBanks are connected in parallel (connected to the same DC bus of the PCS), a maximum 1.0V voltage drop imbalance between SolBank on the same DC input need to be maintained between SolBanks.）

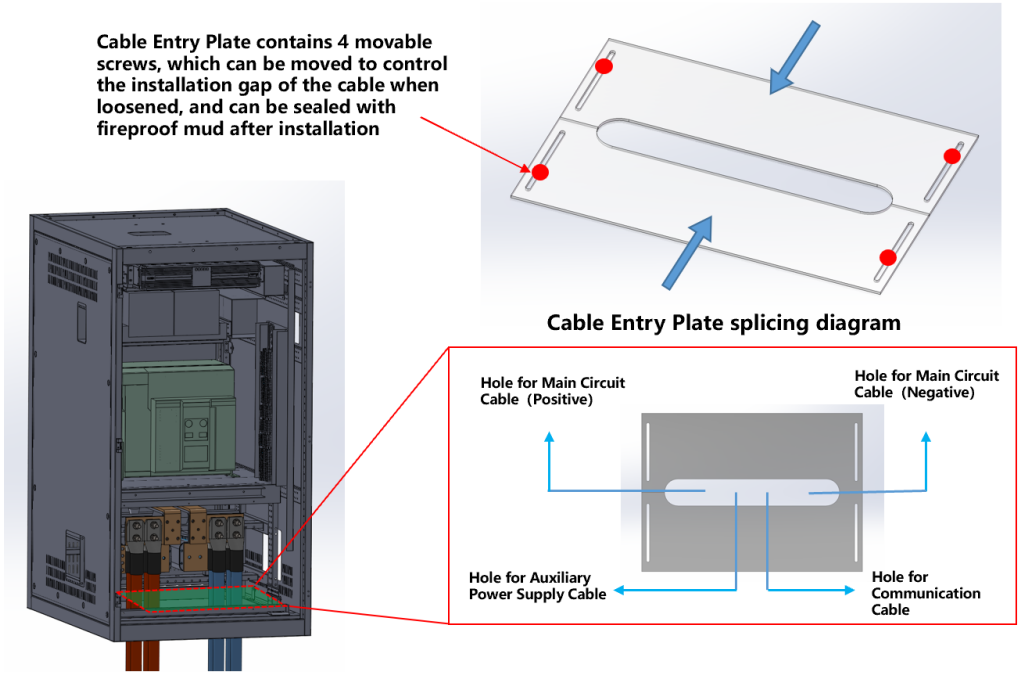


Figure 23: Cable entries of the SolBank with the "Cable Entry Plate"

(Note: Figure 23 provided recommended cable arrangement, the actual panel provided will be blank and could be drilled per cable entry onsite)

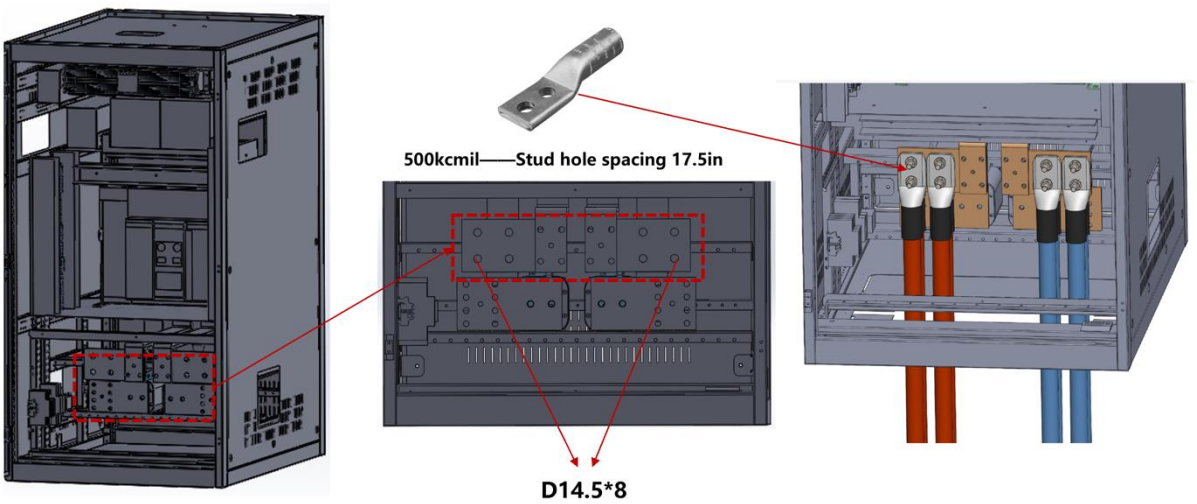
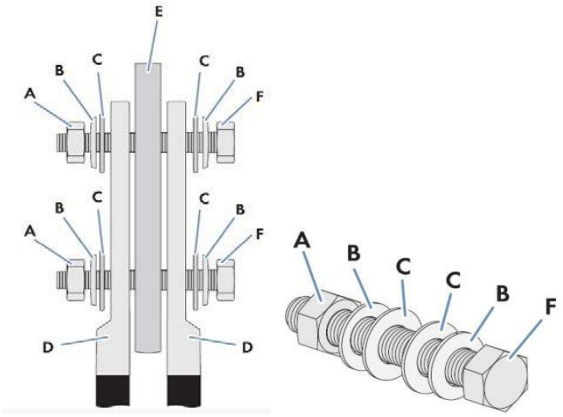


Figure 24: Power cable termination location



Position	Designation
A	M12 Nut
B	Spring washer
C	Baffle washer
D	Double-hole wiring lugs
E	Wiring copper bar
F	M12 Bolt

Figure 25-1: Cable lug hardware assembly refence diagram

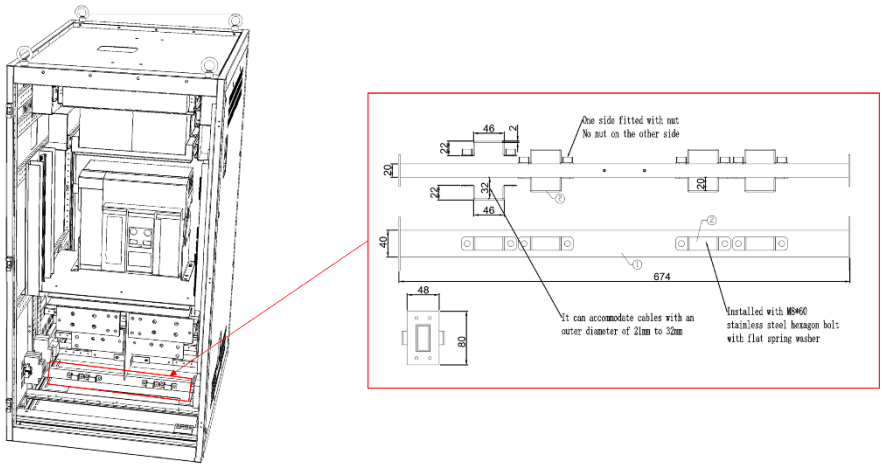


Figure 25-2: Cable wiring reinforcement fixing schematic (21mm≤Cable Diameter≤32mm)

5.6.6 Auxiliary Power Cable, Signal Wires and Communication Cable Installation Procedures

Table 12: Required Materials

Item	Requirements	Remarks

Auxiliary Power Cables	Cable size, type, and length to be specified by the EOR. Each DC SolBank requires a 5-wire circuit. (It is recommended to use a cable of not less than 16mm^2*5 for 0.5P&0.67P, 10mm^2*5 for 0.25P)	Provided by Installer
Communication Cables	Cable length and count to be specified by the EOR. BMS-EMS communication CAT 5e with RJ45 terminations required. Communication rate should not be less than 8Mbps. Shielded wire required if adjacent to power cables.	Provided by Installer
Signal Wires (If designed for the specific project/site)	Cable size, type, and length to be specified by the EOR. Each DC SolBank requires four (4) signal wires. 1. X4:25, X4:26 (Interconnecting dry contacts)+/- with two（2） 1mm² communication wires 2. X3:27, X3:37 (External E-stop Signal Input) +/- with two（2） 1mm² communication wires	Provided by Installer

- ✓ Step 1: Ensure a safe working environment via consult with site safety manager.
- ✓ Step 2: Identify location of SolBank auxiliary power supply terminations, as shown in Figure 27.
- ✓ Step 3: Pull auxiliary power cables from auxiliary power supply to SolBank via the location identified in Figure 23.
- ✓ Step 4: Route cables, cut, and terminate within the U-style compression fittings.
- ✓ Step 5: Identify location of SolBank communication terminations, as shown in Figure 26.
- ✓ Step 6: Pull communication cables from the project EMS (or other devices) to the SolBank via the location identified in Figure 23. Refer to the project specific network diagram, developed by the EOR, for interconnected devices and point-to-point wiring instructions.
- ✓ Step 7: Identify location of SolBank signal wire supply terminations, as shown in Figure 27.
- ✓ Step 8: Pull signal wires from the project EMS (and other devices) to the SolBank via the location identified in Figure 26-1. Refer to the project specific network diagram, developed by the EOR, for interconnected devices and point-to-point wiring instructions.
- ✓ Step 9: Referring to Figure 26-2 or 26-3, install the UPS battery pack.
- ✓ Step 10: Secure all cabling with cable ties. Ensure all cables and conduits are properly labeled.
- ✓ Step 11: Close off all conduits and wire penetrations with duct seal or foam.

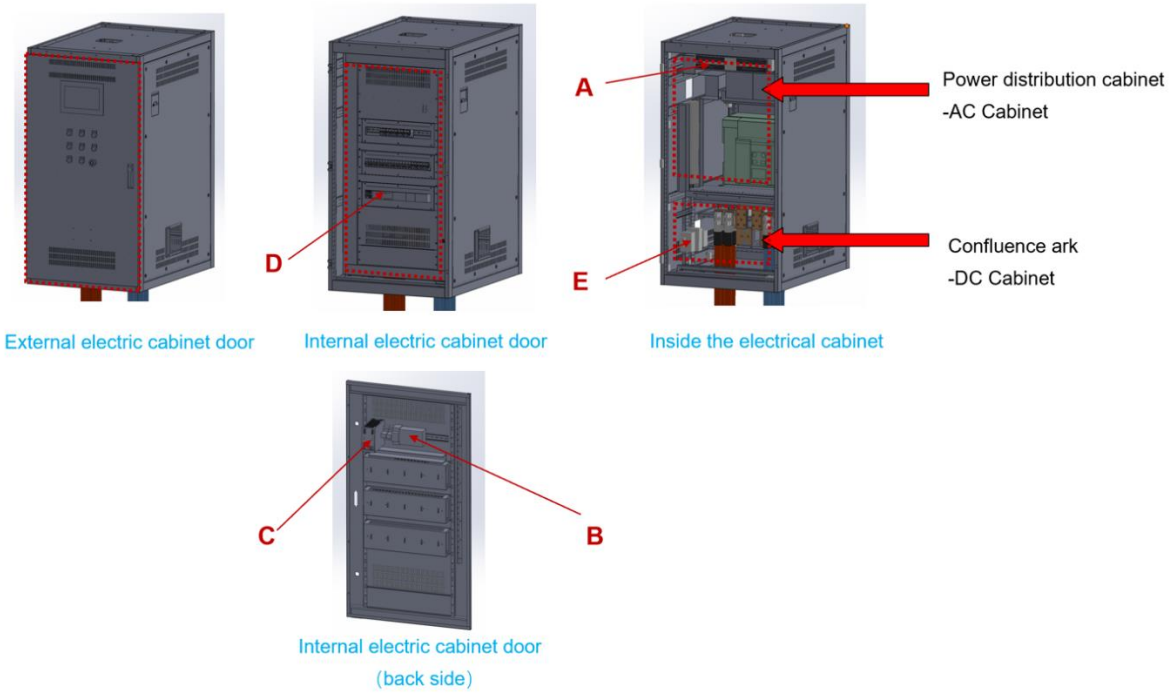
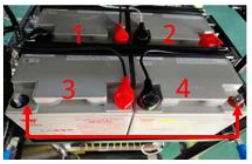


Figure 26-1: Description of power distribution cabinet layout

UPS battery pack installation description (US)

(1) a, Place batteries on the battery rack in a positive or negative order
b, Secure the battery in the specified position with M4's combination screws and battery clamp
c, Connect the black power cable of the UPS to the positive terminal of the battery. The white power cord is connected to the negative pole; Blue ground.

(2) a, Connect the negative terminal of the 1# battery with the positive terminal of the 3# battery. (10AWG 300mm)
b, Connect the positive terminal of the 2# battery with the negative terminal of the 4# battery. (10AWG 300mm)



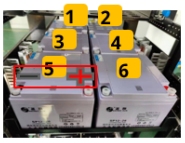
(3) a, Connect the negative terminal of the 3# battery with the positive terminal of the 4# battery. (10AWG 545mm)

(4)a, Install the positive (red) negative (black) electrode sheath;
b. Fix the battery connection cable on the battery hoop with a strapping strap.

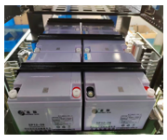
Materials required for installation			
serial number	designation	specification	quantity
1	battery	12Vdc 38Ah	4
2	Battery collar		2
3	Screw (connecting collar)	M4 combination screw	4
4	Battery jacket (red)		4
5	Battery jacket (black)		4
6	Battery cable	10AWG 300mm 10AWG 545mm	2 1
7	stainless steel screw	M6 combination screw	4

Figure 26-2: UPS battery pack installation description (US)

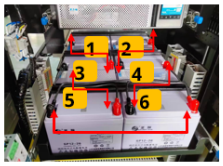
UPS battery pack installation description (UK)



(1) a, Place batteries on the battery rack in a positive or negative order

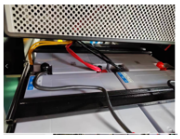


(2) Secure the battery in the specified position with M4's combination screws and battery clamp



(3) a, 1# negative electrode is connected with 3# positive electrode. (10AWG 300mm)
b, the 2# positive electrode is connected with the 4# negative electrode. (10AWG 300mm)
c, 3# negative electrode is connected with 5# positive electrode. (10AWG 300mm)
d, the 4# positive electrode is connected with the 6# negative electrode. (10AWG 300mm)
e, 5# negative terminal is connected to 6# positive terminal.(10AWG 400mm)

Materials required for installation			
serial number	designation	specification	quantity
1	battery	12Vdc 26Ah	6
2	Battery collar		3
3	Screw (connecting collar)	M4 combination screw	6
4	Battery jacket (red)		6
5	Battery jacket (black)		6
6	Battery cable	10AWG 300mm 10AWG 400mm	4 1
7	stainless steel screw	M6 combination screw	6



(4) Access to the UPS power cable will :A. The red power cord is connected to the positive pole of the 1# battery.
b, the black power cord is connected to the negative terminal of the 2# battery.
c, yellow power cord grounding.

(5) a, Use a red battery jacket to cover the positive electrode of the battery.
b, The black battery cover of yoga is placed on the negative electrode of the battery.
c, Fix the wire on the battery hoop with a strapping belt and keep the "UPS" and the battery free.

Figure 26-3: UPS battery pack installation description （UK）

No.	Interface	Remarks
A	UPS	Used for auxiliary power supply in equipment
B	Fiber Channel switch	Ring network communication line
C	24 v power supply	Used for sensor equipment if applicable
D	Watt-hour meter	
E	Auxiliary power terminal	

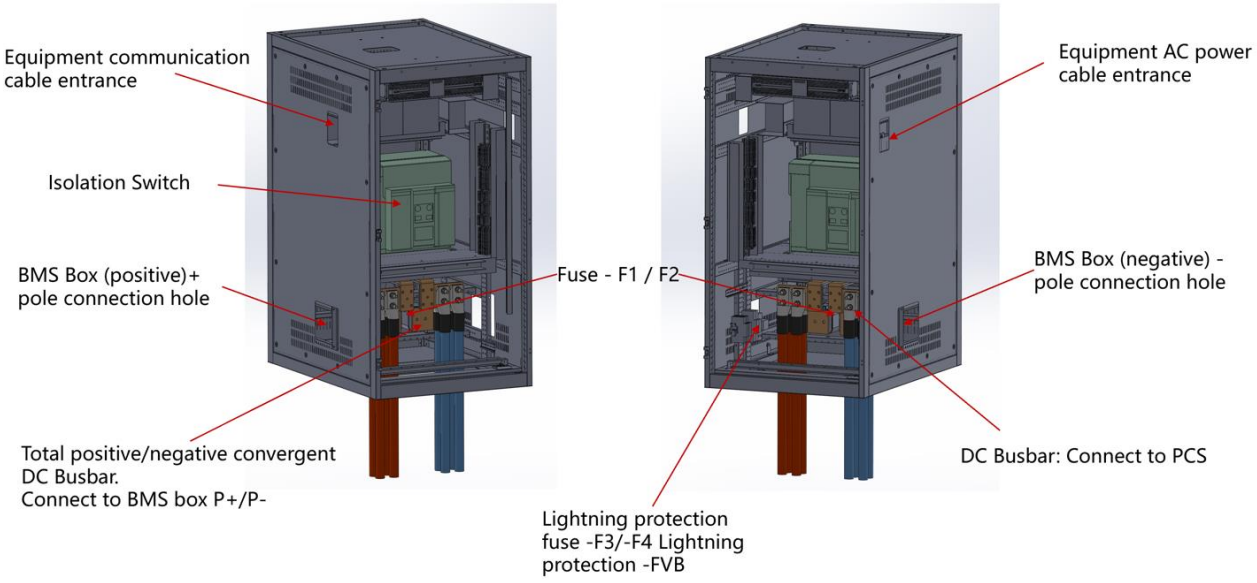
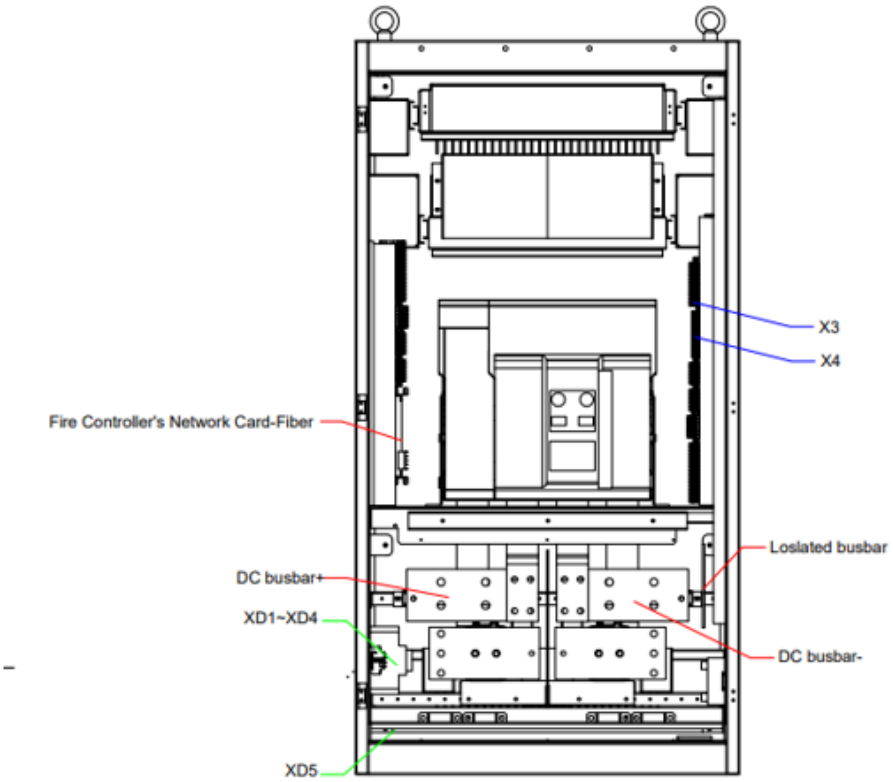


Figure 27-1: Description of busbar layout



Interconnecting dry contacts	X4:25,X4:26	800V,24A
E-stop signal input Communication terminal	X3:27,X3:37	800V,41A

X4:25, X4:26 (Interconnecting dry contacts): When the SolBank is normal, this terminal is normally open signal, when the SolBank has local emergency stop or fire secondary or combustible gas secondary signal, it outputs closed conduction signal.

X3:27, X3:37 (External E-stop Signal Input): When this signal is normally open, SolBank operates normally. When this signal changes to a closed pilot signal, SolBank will control the AC auxiliary power supply of the air conditioner and liquid cooler to be disconnected and the DC contactor of the BMS Box to be disconnected, and the system will stop operating.

Figure 27-2: Description of Dry contact

5.7 SolBank Battery Power Cable Connection

The following sections detail the tasks required to electrically integrate the SolBank's 24 battery packs.

5.7.1 Recommended and Equipment

Table 13: Required Materials

Tool Name	Quantity	Remarks
Basic electrical tools	--	Required for cable and wire management

Misc. construction commodities		Electrical tape, wire labels, cable ties, etc.
PPE	--	Basic PPE and specialized electrical PPE suitable for high DC voltages per site specific EH&S plan

5.7.2 Precautions

The SolBank will arrive on site with batteries installed and partially charged. Batteries cannot be deenergized. Risk of electrocution exists. Exercise extreme caution.

High DC voltage present. Properly rated insulated gloves, insulated footwear, insulted tools, arc flash clothing, and face shields are recommended when working around batteries and energized circuits.

Ensure DC Disconnects are open and battery strings are isolated from PCS when working on system

Always employ proper lock-out-tag-out (LOTO) procedures when on circuits or equipment that have the ability to be energized.

All tasks described in this Section must be performed by appropriately qualified personnel.

Always ensure correct polarity and prevent shorts against rack frames and other grounded devices.

PPE is required during all stages of this process. Refer to EH&S plan for task-specific requirements.

Always label conduits, cables and circuits according to polarity and project labeling requirements.

Always confirm polarity and handle energized cables with care. Improper wiring or accidental shorting against battery rack frames or other grounded devices will void warranty on all battery packs in the impacted string.

5.7.3 SolBank Battery Pack Safety Check

To ensure safe transport of the SolBank, the battery packs have been electrically isolated by disconnecting several interconnection cables. Before the batteries can be reconnected, Insulation Resistance testing needs to be performed on each battery pack. The results of the test are recorded in the “Insulation Resistance Test – Battery Packs” chart, Addendum 1.

Test 1: Positive to Ground **Test 2: Negative to Ground**

Red Test Lead = Battery Positive Terminal
Black Test Lead = Container Ground
Test Voltage = 500Vdc
Test Time = 1 minute
Passing Score = > 20MΩ

Red Test Lead = Battery Negative Terminal
Black Test Lead = Container Ground
Test Voltage = 500Vdc
Test Time = 1 minute
Passing Score = > 20MΩ

5.7.4 SolBank Wiring Instructions

The SolBank contains (48) 1P69S battery packs and eight (8) BMS boxes. A typical battery string consists of six (6) 1P69S battery packs wired in series and connected to a single BMS as shown in Figure 38. Eight (8) such strings exist within each SolBank. The below process describes the field reconnection process.

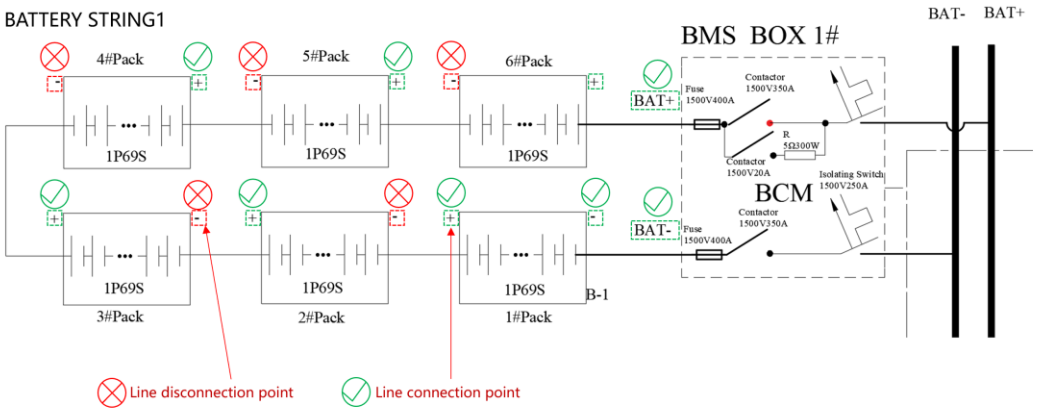


Figure 28: Description of busbar layout

As noted in the precautions section above, these batteries are charged and therefore personnel will be handling and terminating energized cables. Extreme caution and proper PPE are required.

Figure 28: SolBank battery string configuration (1 of 8). The green circle indicates a factory connected battery power cable; a red circle indicates a battery power cable of B+&B- which has been removed for safe transport and must be field installed. See Figure 28

- ✓ Step 1: Consult with the site safety manager to ensure a safe working environment.
- ✓ Step 2: Visually verify the connection path of all cables in the workflow. All required cables are pre-installed with positive connections and quick connectors at the negative end are secured to the bracket. As shown in Figure 28, the cables connecting Battery 1+ and Battery 6- to the BMS box will be pre-installed and the disconnect switches disconnected to be insulated and secured for safe transport.
- ✓ Step 3: Prior to delivery, the Battery 6+ to BMS+ and Battery 1- to BMS- cables will be pre-assembled and secured at the factory end, see Figure 30.
- ✓ Step 4: Prior to delivery, the cluster level power cables will be connected on one side using the pre-assembled quick connectors. Connections to Battery 1+, Battery 2+, Battery 3+, Battery 4+, Battery 5+, respectively. The quick connector connections for these cables should be done at the factory end, and the negative quick connectors will be insulated and fixed to the frame.
- ✓ Step 5: Complete the cluster level power cable connection, battery 1- connect to battery

2+, battery 2- connect to battery 3+, battery 3- connect to battery 4+, battery 4- connect to battery 5+, battery 5- connect to battery 6+ will be done in the field for installation.

- ✓ Step 6: Check that all terminals are securely connected to the battery terminals.
- ✓ Step 7: Secure all cables to the harness mounting plate with cable ties.

5.7.5 SolBank Battery String Safety Check

Before the Battery Cables are connected to the corresponding BMS, Insulation Resistance testing needs to be performed on each battery string. The results of the test are recorded in the "Insulation Resistance Test – Battery Strings" chart, Addendum 1.

Test 1: Positive to Ground	**Test 2: Negative to Ground**
Red Test Lead = Battery Positive Cable	Red Test Lead = Battery Negative Cable
Black Test Lead = Container Ground	Black Test Lead = Container Ground
Test Voltage = 1500Vdc	Test Voltage = 1500Vdc
Test Time = 1 minute	Test Time = 1 minute
Passing Score = > 20MΩ	Passing Score = > 20MΩ

As the cables pass the insulation resistance test, they can be connected to the corresponding BMS terminal.

Figure 29: SolBank C15-1P69S Battery Pack. Battery negative terminal indicated by red circle.

Figure 30: BMS plug receptacles and termination locations. Battery string positive (bottom) and negative (upon) indicated by red circle.

Figure 31: Battery cable quick connect. To install, push into receptacle/terminal until a notable click is heard. To release, press button on side and remove.

6 Inspection and Equipment Cleaning

6.1 Inspection

This section details post installation cleaning and inspection procedures required to be performed prior to system energizing and testing.

6.1.1 Precautions

When cleaning and inspecting the SolBank, always de-energize the system and use LOTO procedures. If de-energizing is not possible, utilize proper PPE and safety procedures.

All tasks described in this Section must be performed by appropriately qualified personnel.

6.1.2 Cleaning Tasks

- ✓ Step 1: Ensure a safe working environment via consult with site safety manager.
- ✓ Step 2: Remove all installation debris from inside the SolBank. Vacuum and clean surfaces where safe to do so.
- ✓ Step 3: Wipe down all interior and exterior surfaces and remove foreign contaminants and debris.

6.1.3 Inspection Tasks

The following are visual inspections:

- ✓ Verify correct operation of doors, latches and seals.
- ✓ Verify all conduits and points of entry are properly sealed.
- ✓ Verify all cables are secured with wire ties and professional wire management techniques were used.
- ✓ Verify all bolts and equipment fasteners are in place and terminated to the proper torque values specified in this manual. Special attention should be paid to primary DC electrical terminations and ground terminations.
- ✓ Verify all conduits and cables are properly labeled.
- ✓ Visually confirm installation is performed per site documentation and all cables and wires are terminated at their proper locations.
- ✓ Visually inspect cables or signs of damage to insulation.

6.2 Commissioning

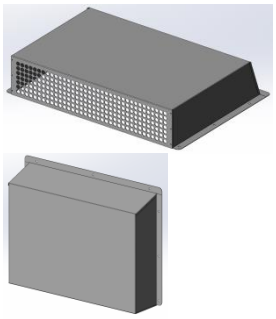
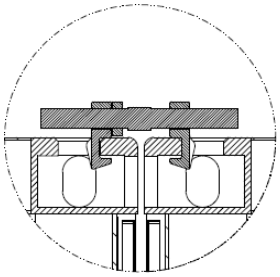
Commissioning procedures and steps will be provided only by Solbank Commissioners. Please contact CSI 6 weeks in advance of planned commissioning to schedule CSI Installation support.

7 Annexes

7.1 Annex 1: Change Log V1.0

V1.0 is the initial version, and updates and changes will be added in this section.

7.2 Annex 2: Installation Parts List

Name	Quantity	Picture	Remarks
Pressure balancer protection cover with Bolts (M5) * 9	1 pcs		The weight of each protection cover is 5kg. (Field installation)
Bridge lock	Project Specific up to 2 pcs per pair of SolBank (for back-to-back installation only)		Fixed back-to-back on top (Field installation)
Container fixing corner piece (twist lock)	Used for four bottom corners of the container fixed, each container installation of 4 pieces		Installation of containers prior to lifting and landing (on-site installation)

7.3 Annex 3: Contact Information

For assistance, please contact CSI Energy Storage System R&D

No.348, Lushan Road, Suzhou 21529,

P.R. China Tel: (0512) 6690-8088
Email:supportAmerica@csisolar.com

7.4 Annex 4: Installation point checklist

Pre-Installation Inspection				
No.	**Check items**		**Check records**	**Remarks**
1	Transportation arrival inspection	Check the exterior for bumps, paint damage		
2		Check the status of the anti-tipping label for proper condition		
3		Check door locks for loss, vandalism		
4		Check that the lamination of openings for air conditioners, fans, pressure equalizers, etc. is intact and undamaged		
5	Unpacking material inspection	Whether the fixing corners are configured		
6		Pressure balancer guard configured or not		
7		Fire control panel batteries are configured or damaged		
8		Whether the fire clay is configured		
9		Whether other auxiliary materials are complete, refer to the "overmatching list".		
10	SOLBANK installation base check	Whether the support points are implemented according to the design support requirements		
11		Whether the leveling level of the support surface meets the flatness requirement		
Signature of inspector:		Date of inspection:		
Post-Installation Inspection				
No.	**Check items**		**Check records**	**Remarks**
1	Structural installation inspection	SOLBANK box fixing corners or bridge locks are in place and torque is confirmed.		
2		Whether the power cable is completed with fireproof mud blocking		
5	Electrical connection check	Ground wire is firmly installed without loosening		
6		Inter-cluster power cable plugs are in place		
7		Is the communication cable loose		
8		DC output power cable is connected in place and not loose		
9	Functional check of fire protection system	Is the backup power normal after battery installation		
10		Whether all fire detectors operate normally, and the host computer has no abnormal alarms		

11		Whether the fan can be started and stopped normally (fan-specific start/stop switch)		
12		Appearance of all detectors in good condition		
Signature of inspector:		Date of inspection:		

7.5 Annex 5: Bolt torque reference table

Bolt Stress to Bolt Torque Conversion Tables

Load on Machine Bolts and Cold Rolled Steel Stud Bolts Under Torque

Nominal Diameter of Bolt (inches)	Number of Threads Per Inch	Diameter of Root of Thread (inches)	Area at Root of Thread (sq. in.)	Stress					
				7,500 psi		15,000 psi		30,000 psi	
				Torque (ft. lbs.)	Clamping Force (lbs./bolt)	Torque (ft. lbs.)	Clamping Force (lbs./bolt)	Torque (ft. lbs.)	Clamping Force (lbs./bolt)
1/4	20	0.185	0.027	1	203	2	405	4	810
5/16	18	0.240	0.045	2	338	4	675	8	1,350
3/8	16	0.294	0.068	3	510	6	1,020	12	2,040
7/16	14	0.345	0.093	5	698	10	1,395	20	2,790
1/2	13	0.400	0.126	8	945	15	1,890	30	3,780
9/16	12	0.454	0.162	12	1,215	23	2,430	45	4,860
5/8	11	0.507	0.202	15	1,515	30	3,030	60	6,060
3/4	10	0.620	0.302	25	2,265	50	4,530	100	9,060
7/8	9	0.731	0.419	40	3,143	80	6,285	160	12,570
1	8	0.838	0.551	62	4,133	123	8,265	245	16,530
1-1/8	7	0.939	0.693	98	5,190	195	10,380	390	20,760
1-1/4	7	1.064	0.890	137	6,675	273	13,350	545	26,700
1-3/8	6	1.158	1.054	183	7,905	365	15,810	730	31,620
1-1/2	6	1.283	1.294	219	9,705	437	19,410	875	38,820
1-5/8	5-1/2	1.389	1.515	300	11,363	600	22,725	1,200	45,450
1-3/4	5	1.490	1.744	390	13,080	775	26,160	1,550	52,320
1-7/8	5	1.615	2.049	525	15,368	1,050	30,735	2,100	61,470
2	4-1/2	1.711	2.300	563	17,250	1,125	34,500	2,250	69,000

Addendum 1: Insulation Resistance Tests

Project Name:

Battery Number:

Serial Number:

Insulation Resistance Test – Battery Packs											
Rack 1			Rack 2			Rack 3			Rack 4		
Bat	+ to gnd	- to gnd	Bat	+ to gnd	- to gnd	Bat	+ to gnd	- to gnd	Bat	+ to gnd	- to gnd
1			1			1			1		
2			2			2			2		
3			3			3			3		
4			4			4			4		
5			5			5			5		
6			6			6			6		
Rack 5			Rack 6			Rack 7			Rack 8		
Bat	+ to gnd	- to gnd	Bat	+ to gnd	- to gnd	Bat	+ to gnd	- to gnd	Bat	+ to gnd	- to gnd
1			1			1			1		
2			2			2			2		
3			3			3			3		
4			4			4			4		
5			5			5			5		
6			6			6			6		

Insulation Resistance Test – Battery Strings							
BMS 1		BMS 2		BMS 3		BMS 4	
+ to gnd	- to gnd	+ to gnd	- to gnd	+ to gnd	- to gnd	+ to gnd	- to gnd
BMS 5		BMS 6		BMS 7		BMS 8	
+ to gnd	- to gnd	+ to gnd	- to gnd	+ to gnd	- to gnd	+ to gnd	- to gnd