



KCE CT 5, LLC

EMERGENCY OPERATIONS PLAN

(EOP)

Disclosure: This document is for planning purposes and may receive further updates upon review and response from local fire departments and permitting agencies. A final version of this document will be produced prior to the initiation of project construction. The final version is intended to be an “operational” document. This comment applies to all sections highlighted and/or completed with “To Be Determined (TBD)”.

VERSION CONTROL

Rev	Date of Issue	Reason for Issue	Prepared By:	Reviewed By:	Approved By:
0	TBD	Issued for Use	B. Garrett	R. Tepp	E. Nelson

Prepared By:	Reviewed By:	Approved By:
Paul Williamson	Bob Garrett	TBD upon completion of final document
Title: Senior Manager, Development	Title: Compliance Officer	Title:
Dept: Development	Dept: Legal and Regulatory	Dept:
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SECTION I: EMERGENCY OPERATIONS PLAN (EOP)

B. EOP SUMMARY

1. Overview

This Emergency Operations Plan (EOP) sets forth the emergency operations plans and procedures of Key Capture Energy, LLC (KCE). The following emergency response procedures are provided so that all personnel understand the practices to be followed to prepare for and provide immediate and effective response* to emergencies that might arise at KCE facilities. Because the safety of employees and the public is of primary concern, the Key Capture Energy (KCE) Emergency Response Coordinator (ERC) and each member of the KCE staff are committed to providing a safe, healthy work environment and are responsible for ensuring implementation of these procedures.

Life safety of personnel shall be the highest priority during any event.

2. Limitations

Responders will coordinate the plan and response according to all applicable laws and standards. Where a conflict exists between this plan and applicable laws and standards, the most conservative and restrictive approach shall be followed.

Response to emergencies, events or disasters shall only be undertaken to the level of the responders' training, Personal Protective Equipment (PPE), and resources available. No persons shall place themselves in harm's way to respond to an emergency.

Actual site conditions may be different than expected in this plan as there may be little to no warning during specific events to implement operational procedures.

3. Management of Change

A review of this Emergency Operation Plan (EOP) shall be conducted and documented at minimum on an annual basis, notionally January of each year. The plan shall also be reviewed and amended whenever there is a change in facility design, construction, operation, or maintenance or mandated regulatory changes that affect emergency response planning. When outside resources are changed or modified the plan shall be reviewed and updated to reflect the changes that may affect this plan. Details on the revision history are provided in Section F.

***Specific response details for each of the defined emergencies above can be found in the Section II Annexes.**



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C. RECORD OF DISTRIBUTION

The following KCE personnel have received access to, and training on, the EOP on the following dates:

TBD upon final version of document.

Name	Title	Date Received Access to EOP	Date Received Training on EOP



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D. EMERGENCY CONTACTS

Name	Title	Contact Information	Can Immediately Address Urgent Requests and Questions During an Emergency
<i>Primary Contacts</i>			
Rachel Goldwasser	Head of Legal & Regulatory	Redacted	X
Erika Nelson	Head of Project Operations	Redacted	X
Joel Turkheimer	Head of Market Development	Redacted	X
<i>Backup Contacts</i>			
TDB			



E. APPROVAL AND IMPLEMENTATION

1. Introduction to EOP

The EOP details roles and responsibilities for coordinating emergency response activities before, during, and after any type of emergency or disaster at KCE operational facilities.

The intent of the EOP is to coordinate emergency response efforts to save lives, reduce injuries, and maintain business continuity with its primary goal to assemble, mobilize and coordinate a team of responders and coordinators that can deal with any emergency.

This plan is implemented by the individual identifying an Emergency Condition either by dialing 911 or contacting the posted Emergency Contact Number. An emergency response coordinator (ERC) shall be assigned immediately upon identification of an Emergency Condition. The ERC is typically the Operations Manager for the associated facility but can be any individual who has been identified as having a role in the EOP.

2. Personnel with Responsibility for EOP

The following KCE personnel are responsible for maintaining and/or implementing the EOP, and/or have authority to change the EOP, as indicated:

Name	Title	Responsible for Maintaining EOP	Responsible for Implementing EOP	Authority to Change EOP
Erika Nelson	Head of Project Operations	X	X	X
TBD	O&M Manager		X	

3. Revision Control

Since the EOP’s initial preparation, revisions have been made to the EOP on the following dates:

Revision No.	Date Revised	Description of Revision

4. Currentness of EOP

KCE hereby affirms, as of [Date-TBD], that this EOP supersedes all previous EOPs. This EOP was most recently approved by KCE on [Date-TBD].



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5. Training Requirements

KCE has initiated an annual training program for personnel who are expected to have a role or responsibility included in this Emergency Operation Plan. This training program covers all aspects of the EOP. Personnel training will be completed and documented on an annual basis.

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F. COMMUNICATION PLAN

1. Purpose & Scope

Key Capture Energy is dedicated to safe and responsible operations. As such, KCE is responsible for maintaining communications with people and organizations affected by an incident, emergency or unforeseen accident involving company operations, projects, or people. This plan applies to all incidents covered by this document.

2. Communications Responsibilities


Core Communications Team: The Core Communications Team will be responsible for formulating a communications response under this EOP. The Core Communications Team will convene as promptly as possible following the occurrence of the relevant incident or event and shall continue to meet regularly as the incident and the response thereto develops.

Purpose of Meetings: The meetings of the Core Communications Team will convene the relevant subject matter experts and managers of KCE required for effective information sharing and response formulation following an incident. The meetings will provide a forum for:

- exchange of information as to the relevant facts and circumstances surrounding the incident, operational actions that KCE is taking in response, and inquiries and other requests from affected stakeholders;
- communications response planning, including ensuring that all required stakeholders are notified and that KCE's messaging is unified and accurate; and
- planning for long-term incident response.

Team Members: The members of the Core Communications Team are as follows:

- Head of Operations (primary)
- Head of Legal & Regulatory
- Head of Construction
- Head of Market Development
- Head of HSEQ
- Head of Project Operations
- Emergency Response Coordinator (ERC) as designated via the EOP for the incident.

Additionally, incident-specific team members may be added to the Communications Team (as required by the Core Communications Team) for purposes of any specific incident. 

2. Specific Points of Contact

Specific members of the Core Communications Team will serve as the points of contact responsible for communicating with specific stakeholders. Each designated member under this sub-section 3 is



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responsible for reporting communications with their respective stakeholders back to the rest of the Core Communications Team.

Media: Messaging to the media is to be formulated by the Core Communications Team. In the immediate aftermath of an incident, The Core Communications Team will identify a spokesperson, as required, to speak to media.

State Public Utilities Commission: KCE's Head of Legal & Regulatory, in consultation with the Core Communications Team, is responsible for communications with the respective state public utilities commissions.

Consumer Advocates: KCE's Head of Legal & Regulatory, in consultation with the Core Communications Team, is responsible for all communications with consumer advocate groups.

Fuel Suppliers: N/A. KCE does not own or operate assets with fuel suppliers.

Local and State Government Entities, Officials, and Emergency Operations Centers: The on-site ERC is responsible for communications with local and state government entities, officials, and emergency operations centers. The ERC is directed to provide local and state officials and emergency operations centers with the information that is immediately required to respond to an ongoing incident. Long-term response (including in respect of any remediation and/or root cause analysis for an incident) shall be developed by the Core Communications Team and communicated through the ERC or another designated member of the Core Communications Team, as appropriate.

Reliability Coordinator: KCE's Head of Market Development is responsible for all communications with the applicable reliability coordinator. The Head of Market Development shall keep the applicable reliability coordinator apprised of any incident by telephone, as appropriate.



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G. MAINTENANCE OF PRE-IDENTIFIED SUPPLIES FOR EMERGENCY RESPONSE

As BESS facilities are normally unmanned and, except as otherwise referenced herein, do not require the use of consumable supplies, no supplies are expected or necessary to support KCE response to emergencies detailed in this plan.



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H. STAFFING DURING EMERGENCY RESPONSE

As BESS facilities are normally unmanned, no on-site staffing is expected or necessary during emergency response. Except as may be specifically stated otherwise in this EOP, during an emergency the BESS will remain unmanned and, where applicable, personnel will be precluded from accessing the BESS unless / until determined safe for inspection / maintenance activities. In the case of a weather emergency impacting one of KCE's offices, employees not located in the impacted region shall be knowledgeable in and prepared to support the impacted state's operations. For further information related to staffing during severe weather events, please see Appendix 6.



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I. IDENTIFICATION OF WEATHER-RELATED HAZARDS

See SECTION II: Annex A (WEATHER EMERGENCIES) and Annex E (HURRICANE) for information regarding how KCE identifies weather-related hazards of various types. KCE has developed both Cold and Hot Weather Operating Plans with specific operational instructions to address extreme weather events. These plans are provided in Appendix 6 for reference.



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J. ACTIVATION OF EOP

1. Definition of Emergency

An emergency is defined as a situation in which the known, potential consequences of a hazard or threat are sufficiently imminent and severe that an entity should take prompt action to prepare for and reduce the impact of harm that may result from the hazard or threat, including an emergency declared by local, state, or federal government, or Independent System Operator (ISO) or another applicable reliability coordinator. Emergencies can happen before, during or after work hours and can be caused by a range of events and hazards involving both nature and people. For the purposes of this EOP, “incident”, “emergency”, and “event” are interchangeable terms. The many different types of emergencies include, but are not limited to:

- Smoke
- Fire
- Toxic Gas Release
- Medical Emergency
- Severe Weather
 - Extreme Heat
 - Winter Storm (Extreme Cold)
 - Hurricanes
 - Tornadoes
 - Floods
 - Lightning Storms
 - Drought / Water Shortage
- Seismic Event
- Hazardous Material Spill
- Workplace Violence
- Cybersecurity Threat
- Bomb Threats
- Pandemic / Epidemic
- Physical Security Breach

2. Activation of Emergency Response

In the event of an emergency, calling 911 is the preferred method for initiating emergency response. This should be followed by contacting KCE at the emergency contact phone number listed.

As set forth in Section III: Appendix 5 – Site Information, the KCE emergency contact phone number is clearly marked on informational/warning signs around the perimeter fencing and may be dialed by any individual, whether an employee or a member of the public. This line is answered 24 hours a day, 365 days per year by personnel instructed in how to initiate emergency response for the facility. The person receiving a call through the emergency contact number shall initiate this EOP by contacting the KCE Emergency Response Coordinator (ERC). As previously stated in Section E, the ERC is typically the Operations Manager for the associated facility but can be any individual who has been identified as having a role in the EOP.



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3. Site-Specific Emergency Response

Responders will coordinate the plan and response according to all applicable laws and standards. Where a conflict exists between this plan and applicable laws and standards, the most conservative and restrictive shall be followed.

Response to emergencies, events or disasters shall only be undertaken to the level of the responders' training, Personal Protective Equipment (PPE), and resources available. No persons shall place themselves in harm's way to respond to an emergency.

Actual site conditions may be different than expected in this plan as there may be little to no warning during specific events to implement operational procedures.

4. Roles & Responsibilities

All KCE personnel with responsibilities for emergency response management or support shall be trained in the requirements of this plan on an annual basis.

Overall responsibility for the EOP lies with the Operations and Maintenance (O&M) Manager who executes the duties of the ERC. The ERC or their designee is responsible for program implementation, including coordinating severe weather activities, communicating emergency response procedures to personnel, and contractor coordination as needed. In addition, the ERC shall conduct routine updates and overviews with Emergency Responders including tabletop exercises, walkthroughs, and drills.

The personnel identified below shall have the corresponding responsibilities described below in connection with activation of the EOP.

Operations & Maintenance Manager (or designee)

- Initiate emergency response if not already initiated by the Remote Operations Center (ROC) by dialing 911 or calling local emergency response organizations directly as may be appropriate. Information to be provided to 911 operator or local emergency response organizations include:
 - location, type, and current status of the incident.
 - personnel injury (number, severity, status) if applicable.
 - property damage (type, severity) if applicable.
 - actions taken or in progress.
 - any safety guidance to ensure the safe arrival of response organizations;
 - ERC contact information.
 - contact information for the on-scene coordinator (if different than the ERC);
- Establish themselves as the ERC.
- Mobilize to the site and assume additional responsibility of On-Scene Coordinator.
- Communicate with all parties during an emergency.
- Direct the isolation of the facility from the grid when required or requested.



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- Direct the isolation of electrical equipment to the maximum extent possible
- Monitor local news channels for critical information from the National Weather Service (NWS) including watches, warnings, and advisories for winter storms, tropical storms, and hurricanes issued by local NWS Forecast offices.
- Responsible for implementing and ensuring personnel familiarity with this EOP.

The Operations & Maintenance (O&M) Manager, or their designee acting as the ERC or On-Scene Coordinator, shall be responsible for reporting the incident throughout KCE using the process included in the KCE HSEQ Manual. Specifically, the ERC shall initiate an e-mail via INCIDENTS@keycaptureenergy.com for informing relevant operations and administrative contacts within KCE, to initiate corporate awareness and public communications activities in accordance with company structure and policies. The e-mail shall be formatted:

- *Subject: Initial Report – Location – Initial Classification – Date*
- *Body: Brief description of the event to include WHO, WHAT, WHEN, WHERE*

On-Scene Coordinator (Operations & Maintenance (O&M) Manager employee; if on-site)

- If there are employees on-site, the senior-most of such on-site employees will act as the On-Scene Coordinator and shall assist in the implementation of this plan by:
 - calling 911 (if not already done);
 - evacuating all personnel and securing the scene;
 - accounting for all personnel at a muster area;
 - assisting the evacuation of injured personnel if necessary;
 - communicating with the ERC during the emergency;
 - reporting the status of the facility to include evacuation of all on-site personnel;
 - liaising with any on-scene emergency responders*;
 - maintaining a written log and timeline of all response activities undertaken;
 - directing all media inquiries to the Communications Team;

***The On-Scene Coordinator, or the designated ERC when no KCE representative is on-site, will act as the liaison to the Fire Department and any other first responders until the ERC arrives on-site.**

All On-site Personnel

- Immediately report emergency situations to the senior KCE representative on-site;
- Call 911 to inform local emergency first responder personnel**;
- Notify the ERC of the situation using the KCE emergency contact phone number posted onsite

****There shall be no delay to report emergency events that require local emergency responders. The senior KCE representative, if on-site, will call 911 and then immediately notify the ERC using the emergency contact phone number posted on-site.**



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Chief Operating Officer (COO) or Head of Operations

- Act as the liaison to the Management Team and Communications Team;
- Affirm, through endorsement of this EOP that all relevant operating personnel are familiar with this EOP and committed to following the plan, except to the extent where deviations are appropriate under the circumstances during the course of an emergency;
- Provide resources necessary to expeditiously restore BESS facilities to operation after an emergency event;
- Prioritize the recovery of BESS capacity (restoration) after an emergency once determined safe to do so.

Market Operations

- Monitor conditions and liaise as required with market stakeholders and the reliability coordinator as may be required during an emergency and detailed throughout this plan.

Legal and Government Relations

- Support in risk mitigation throughout the duration of the emergency;
- Be prepared to assist or perform outreach and reporting to the appropriate State and Federal Government agencies as may be required.

Public Relations Team

- Be prepared to implement the necessary Communication Plan consistent with the emergency event.

5. Preparation & Planning

Pre-planning for emergencies is a crucial element of this plan. The following steps will be taken:

- Consistent with KCE's Public Awareness Manual, fire departments and other first responders will receive a copy of this plan, participate in an on-site familiarization meeting, and be updated annually on any changes in equipment or operations;
- A copy of this plan shall be located at each facility;
- Buildings and property surrounded by fencing will be marked by signage that identifies specific hazards (such as the NFPA diamond, and all applicable Danger, Caution, Warning signal words);
- On-site personnel shall receive a directive to keep vehicles not actively in use for maintenance or repair activities out of the BESS fence perimeter to facilitate and ensure emergency egress when necessary;
- Safe approach distances are established for equipment's different failure modes and personnel are trained in these distances;



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- Safety Data Sheets (SDS) provided by manufacturers shall, where possible, be maintained on-site and provided to first responders.

NOTE: As BESS facilities are normally unmanned, no supplies are expected or necessary to support KCE response to emergencies detailed in this plan. During extreme weather, BESS will remain unmanned, and personnel will be precluded from accessing the BESS until determined safe for inspection / maintenance activities.

NOTE: BESS facilities do not utilize alternative fuels and therefore do not require on-site fuel storage or fuel testing requirements

6. Incident Assessment Matrix

As previously discussed, when an incident occurs at any level members of KCE's Communications Team will be notified. The Team will then convene and initiate the steps for evaluating and determining the severity of the event. An Incident Assessment Matrix is provided in KCE's internal Communications Plan to guide this effort. The Team will utilize the Incident Assessment Matrix to inform the ERC or other On-Scene Coordinators of the final determination for the respective incident.

7. Warning Systems & Alarms

Audible and visual (e.g., flashing lights) alarm systems have been established that reflect specific on-site hazard analyses. Personnel shall be trained on the significance of different alarms and the corresponding actions as outlined elsewhere in this plan.

Warning systems and alarms are tested at least every six months or more frequently per manufacturer specifications or code requirements are documented as completed. All site personnel, as well as those offsite at remote operations control centers shall be made aware of tests so as not to cause undue concern.

8. Emergency Response & Evacuation

No employee is required or permitted to place themselves in harm's way in order to facilitate extinguishment, evacuation, or rescue. All rescue operations will be performed by trained professionals upon their arrival. Rescue operations will only be conducted after a risk-reward analysis is done and proper PPE is used to protect against any adverse hazards that may be encountered.

Only personnel who are properly trained in accordance with 29 CFR Part 1910.120(q)(6) may respond to hazardous chemical releases.

If personnel are onsite, they shall be required to evacuate to the designated muster areas for:

- Smoke
- Fire
- Toxic Gas Release



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- Severe Weather
 - Hurricanes
 - Tornadoes
 - Floods
 - Lightning Storms
- Seismic Event
- Hazardous Material Spill
- Bomb Threats

The general procedure for evacuation shall be to:

- Stop all work activities as quickly as can be done so safely;
- Follow the emergency response flowchart;
- Secure the work area to prevent additional hazards;
- Calmly leave the work area and meet at a designated muster area;
- Provide egress assistance to other personnel if needed;
- Standby for instructions from the On-Scene Coordinator or ERC.

SECTION II: ANNEXES

A. ANNEX A – WEATHER EMERGENCIES

1. Extreme Heat

BESS are normally unmanned facilities designed with dedicated climate control and therefore have minimal exposure to hazards associated with extreme heat. The KCE HSE Manual provides direction for personnel protection from extreme heat. KCE will deem there to be an extreme heat event when the temperatures are forecasted to go above the design limits of the BESS or upon notification of an extreme heat event by the ISO or other regulatory entity.

When a summer weather threat exists, the facility's O&M Manager shall monitor local news channels for critical information from the National Weather Service (NWS) including warnings and advisories issued by local NWS Forecast offices.

For more information related to KCE's extreme weather response, please see the Hot Weather Operations Plan, provided in Appendix 6.

2. Winter Storm (Extreme Cold)

BESS are normally unmanned facilities designed with dedicated climate control and are therefore minimally susceptible to issues associated with extreme cold. The KCE HSE Manual provides direction for personnel protection from extreme cold. KCE will deem there to be an extreme cold event when the temperatures are forecasted to go below the design limits of the BESS or upon notification of an extreme cold event by the ISO or other regulatory entity.

When a winter weather threat exists, the facility's O&M Manager shall monitor local news channels for critical information from the National Weather Service (NWS) including winter storm watches, warnings, and advisories issued by local NWS Forecast offices.

For more information related to KCE's extreme weather response, please see the Cold Weather Operations Plan, provided in Appendix 6.

3. Hurricane

See Annex E (HURRICANE) below.

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4. Tornado

BESS are normally unmanned facilities designed to local codes and standards and therefore have limited exposure to hazards associated with tornadoes.

When a tornado threat exists, the facility's O&M Manager shall monitor local news channels for critical information from the NWS including watches, warnings, and advisories issued by local NWS Forecast offices.

If personnel are on-site when the potential for a tornado exists, and prior to experiencing sustained winds >25 miles per hour, material shall be secured, and any aerial work stopped upon the issuance of a tornado warning. The facility shall be evacuated, and all personnel will report to the nearest shelter area, to be determined prior by O&M personnel during daily safety briefs. In the event O&M personnel are outside and unable to evacuate to the shelter, the following guidance is provided to personnel on-site:

- lie flat in a nearby ditch or depression, covering their head with their hands, being aware of the potential for flooding;
- find shelter in a low, flat location;
- avoid sheltering under an overpass or bridge;
- do not try to outrun a tornado in congested areas in a vehicle;
- leave their vehicle to find safe shelter;
- be aware of the potential for flying debris.

Following tornado or high wind events, the facility will be evaluated by the O&M personnel for damage. All repairs will be performed under standard operational procedures.

5. Flooding and Flash Flood

BESS are normally unmanned facilities designed to local codes and standards and therefore have limited exposure to hazards associated with flooding.

When a flooding threat exists, the facility's O&M Manager shall monitor local news channels for critical information from the NWS including watches, warnings, and advisories issued by local NWS Forecast offices.

Flash flooding is a result of heavy localized rainfall such as that from slow moving, intense thunderstorms. Flash floods often result from small creeks and streams overflowing during heavy rainfall. These floods often become raging torrents of water which rip through riverbeds or canyons, sweeping everything with them. Flash flooding can occur within 30-minutes to six hours of a heavy rain event. In hilly terrain, flash floods can strike with little or no advance warning. Distant rain may be channeled into gullies and ravines causing flash flooding in minutes. In the event of a flash flood, the following guidance is provided to personnel onsite:



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NOTE: It does not have to be raining for flash flooding to occur.

- do not drive through flooded areas, even if it looks shallow enough to cross;
- person leading work shall make a judgement to either shelter in place, or immediately secure the work and travel to safe refuge;
- do not cross flowing streams on foot where water is above your ankles;
- be especially cautious at night as it is harder to recognize water danger then;
- do not attempt to outrace a flood on foot if flooding is seen or heard, move to higher ground immediately;
- be familiar with nearby land features where you work;
- wait 15 to 30 minutes, or until high water recedes, prior to leaving shelter.

6. Lightning Storms

BESS are normally unmanned facilities designed to local codes and standards and therefore have limited exposure to personnel hazards associated with lightning.

If personnel are onsite and a lightning storm is within 10 – 30 miles and approaching the site, the following guidance is provided:

- notify facility's O&M Manager and all on-site employees;
- stop work safely and head to company or personal vehicles if storm/lightning is still approaching the site, get in and stay in vehicles that have rubber tires only;
- once storm passes, remain in vehicle for at least 30 minutes depending on passing storm severity, and wait for an "OK" from the O&M Manager in charge of monitoring the storm.

Market Operations Responsibilities

In the case of any inclement weather, the Market Operations Team shall:

- monitor all communications from Independent System Operators (ISOs) including, but not limited to Operating Condition Notices (OCN), Advisories, and other communications;
- ensure site operations are aware of all ISO notices regarding impending winter weather;
- communicate with ERC regarding any such communications;
- ensure KCE representative is on-call 24/7 to receive and respond to notices and to communicate internally (including ERC) and with site operator / ROC during periods when ISOs have issued a weather notice;
- ensure local Transmission Distribution Service Provider (TDSP) has KCE/ROC contact info heading into any period when ISO has issued a weather notice.



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B. ANNEX B – WATER SHORTAGE

BESS are normally unmanned facilities that do not require water or access to a water source and are unaffected by water shortages during operational periods.



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C. ANNEX C – RESTORATION OF SERVICE

Once emergency response is complete and locations are determined to be safe for personnel access, where required, Head of Operations and Head of Project Operations, with advice from the ERC, Head of Market Development, and General Counsel, shall determine whether restoration of service is safe and appropriate. Restoration of service shall be performed in coordination with the applicable Qualified Scheduling Entity and with the appropriate approvals (if required) from the Independent System Operators (ISO).



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D. ANNEX D – PANDEMIC AND EPIDEMIC

BESS are normally unmanned facilities therefore have limited exposure to personnel hazards associated with outbreaks and pandemics. Guidance associated with pandemic response shall be included in the KCE Safety Manual or provided as a standalone pandemic guideline. KCE is able to operate under work-from-home conditions if required due to a pandemic or epidemic.



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E. ANNEX E – HURRICANE

BESS are normally unmanned facilities designed to local codes and standards and therefore have limited exposure to hazards associated with hurricanes.

When a hurricane threat exists, regardless of Category, the facility's O&M Manager shall monitor media outlets for critical information from the NWS including watches, warnings, and advisories issued by local NWS Forecast offices and shall be cognizant that conditions can change rapidly.

Evacuation and re-entry planning for assets located in Hurricane Evacuation Zones shall follow the guidance provided by local authorities.

The following are the general guidelines for hurricane conditions.

CONDITION 4

- hurricane within 72-hours of arrival, and possible movement towards facility;
- brief all personnel;
- avoid on-site work and travel;
- start clean-up and securing operations, if required;
- plan for next condition.

CONDITION 3

- hurricane within 48-hours of arrival;
- intensify clean-up and securing operations, if required;
- evaluate starting some Condition 2 activity.

CONDITION 2

- hurricane within 24-hours of arrival;
- complete all clean-up and securing operations, if required.

CONDITION 1

- hurricane within 12-hours of arrival;
- shutdown all on site activities, if any;
- complete all items above;
- ensure complete evacuation of facility if any personnel onsite;
- ensure ROC monitoring until hurricane passes.

POST HURRICANE

- once practical to visit site, a walkdown shall be conducted starting with a perimeter walk outside the fence, re-entering inside the fence after visually confirming conditions are safe to continue;
- take pictures from all sides of the facility for documentation.



SECTION II: ANNEXES

F. ANNEX F – CYBERSECURITY

Below is KCE’s Cybersecurity Incident Response Plan. KCE maintains additional cybersecurity-related plans and procedures not submitted herein.

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G. ANNEX G – PHYSICAL SECURITY

Sabotage may take different forms and it would be impossible to define any and all sabotage that could occur. KCE follows the NERC Event Reporting Plan used to comply with NERC Standard EOP-004 and also adheres to NERC’s Critical Infrastructure Protection (“CIP”) Standard, CIP-003 (Cyber Security Incident Response Plan). Additionally, the following checklist shall be used when responding to physical security, as well as cybersecurity, incidents:

1	If sabotage has been identified or reported immediately notify the O&M Manager.
2	The O&M Manager will determine when and if it is safe for personnel to continue work on site (if personnel are on-site) and, as required, make appropriate notifications to personnel based on initial information and site condition.
3	If appropriate call 911 or another designated Emergency Services provider. Refer to site contact and location information to ensure prompt response.
4	If off-site Emergency Response personnel are required, the O&M Manager shall coordinate to ensure access to the site and proper direction.
5	If appropriate, the O&M Manager shall notify appropriate law enforcement as necessary to conduct an investigation*.
6	If sabotage resulted in creating an unacceptable safety risk, the affected equipment shall be shut down or affected area cleared and barricaded.
7	The O&M Manager shall notify the Head of HSEQ and CIP Senior Manager to determine whether the event is reportable in accordance with NERC Reliability Standard EOP-004.

*** Any instances of trespassing, vandalism, or suspected criminal activity shall be immediately reported to O&M Manager so that local police can be engaged. The O&M Manager shall use judgement to determine whether components of this EOP shall be activated.**



SECTION II: ANNEXES

H. ANNEX H – FIRE

1. Smoke/Flames from an Unknown Source

Smoke emanating from a KCE BESS is an indication of an abnormal and hazardous condition and can be indicative of potential issues including a thermal runaway event. The smoke is possibly flammable and inhalation hazard, and may ignite at any time.

If fire or smoke is observed emanating from a KCE BESS at any time it shall be treated as a fire.

- evacuate personnel to a designated muster location
- contact the senior KCE representative on-site or, in their absence, dial 911
- contact the KCE emergency contact phone number posted on-site to inform the ERC
- prevent non-emergency responder access to the BESS

If a report of smoke emanating from a BESS with no personnel on-site is received, the person receiving the report shall call the Emergency Services Dispatch Number set forth in Appendix 4 – Site Information and then the Emergency Contact Number for the site (also included in Appendix 4 – Site Information).

2. Fire External to Battery Container or Enclosure

In the event there is a visible fire beyond the incipient stage external to a battery container or enclosure, including fires external to the perimeter fencing, then the following actions apply.

NOTE: Batteries remain energized even if all contactors, breakers, and switches have been opened.

- Contact the senior KCE representative onsite or, in their absence, dial 911
- Evacuate the site via the safest egress path and report to the designated muster location.
 - if heavy smoke is encountered stay low and breathe through a handkerchief or other fabric; move away from the area;
 - assist anyone having trouble leaving the area so long as doing so does not put the assister at additional risk;
 - do not leave the designated muster point until advised to do so by ERC.
- On-Scene Coordinator shall account for all employees, contractors, and visitors;
- Contact the KCE emergency contact phone number posted onsite to inform the ERC;
- Remove any obstructions (vehicles, material, etc.) that might impede the response of emergency personnel to the scene;
- Establish appropriate barriers and traffic barricades to keep unauthorized (non-emergency) personnel from accessing BESS;
- Once the Fire Department is onsite, provide:
 - SDS
 - site-specific EOP
 - a liaison to remain with the Fire Department, when possible
 - To the maximum extent possible, responding fire crew should remain outside the fence, pull back to a safe distance and continue to allow the fire to burn itself out.

SECTION II: ANNEXES

- A Fire Department staging area will be designated on the final plans outside of the project fence line (see Figure 2). It is recommended that fire department staging areas are established at angles relative to the sides of the ESS enclosures to reduce potential impact from flying projectiles or debris in the event of an explosion event.
 - **The Fire Department should not attempt to enter the site fence line unless there is clear threat to life safety.**
 - Allow the container to burn until it self-extinguishes, while protecting surrounding areas (defensive firefighting).
- Follow the instructions of Emergency Responders;
 - Do not re-enter site until fire department has turned the site back over to KCE O&M Manager and KCE SME issues an 'all clear' for designated personnel.

NOTE: During defensive firefighting efforts application of high volumes of water from an appropriate distance may be applied to the outside of the container to help cool the unit and prevent further reactions or a fire from developing. Fire crews may choose to utilize a water stream or fog pattern to protect the surroundings or control the path of smoke.

NOTE: The ERC shall coordinate with BESS Supplier and direct disconnecting the BESS from the grid once notified of a fire event that has the potential to impact operations.

If a report of fire external to a BESS container with no personnel onsite is received, the person receiving the report shall call the Emergency Services Dispatch Number and then the Emergency Contact Number for the site (included in Appendix 4 – Site Information).

3. Fire Internal to Battery Container or Enclosure

In the event there is a known or suspected fire internal to a battery container or enclosure, then the same actions apply as a fire external to a battery container, but the below MUST be noted.

NOTE: Some fire suppression systems are designed to work in a contained environment and some ventilation systems have programmed functionality to improve effectiveness. DO NOT open container or enclosure doors until it has been determined no hazards are present, and with approval of emergency personnel and the Executive VP of Operations. Atmospheric monitoring, either remotely or via local sampling, is required to confirm atmosphere will not become explosive when outside air is admitted to container or enclosure.

4. Post-Fire Overhaul

The fire department will make the final determination regarding when the scene is safe to release the site to staff. In some circumstances the scene may need to be safeguarded for investigators to examine the event failures. If the event was caused by a criminal act, the facility's O&M Manager shall be guided by law enforcement for direction.

Hazards after a fire should be identified at the time of installation such that recommendations for personal protective equipment (PPE) are available for clean-up crews and hazardous materials

SECTION II: ANNEXES

(HAZMAT) teams. This may include respirators to protect personnel from toxic gas that continues to be generated from hot cells. Firewater retention and cleanup measures may be required by local regulations. Once first responders have turned the site back to KCE, the SME(s), in coordination with the ERC, shall direct on-site personnel on procedures for securing the site for safety and pending any investigation.

In addition to the gas generation risk, cells that remain hot also pose a delayed ignition risk, whereby heat in the cell may transfer to undamaged adjacent cells or remaining active material and reignite the fire. As such, fire-damaged equipment must remain monitored, remotely or by establishing a fire watch onsite for a minimum Twenty-four (24) hours to extend to a period of length identified in consultation with equipment manufacturers and the SME(s).

Care should be taken to ensure that damaged batteries containing energy have been handled safely in accordance with disposal procedures. For batteries involved in a fire, care should be taken with handling or dismantling battery systems involved in fires as they may still contain hazardous energy levels.

5. Conditions Associated with Energy Storage Systems

BESS are generally new applications of existing technology currently gaining widespread adoption. It is important to recognize certain technical aspects when developing response actions.

Unique Challenges

Energy storage systems present a unique challenge for fire fighters. Unlike a typical electrical or gas utility, an energy storage system does not have a single point of disconnect. Whereas there are disconnects that will de-energize select parts of the system, the batteries themselves will remain energized.

The following hazards may be encountered when fighting fires in energy storage systems:

- shock or arcing hazard due to the presence of water during suppression activities
- electrical enclosures may not resist water intrusion from high-pressure stream of a fire hose
- batteries damaged in the fire may not resist water intrusion
- damaged conductors may not resist water intrusion
- shock hazard due to direct contact with energized components
- no means of complete electrical disconnect
- chemical spills
- flammable gases
- toxic gases (visible and non-visible)
- thermal runaway and explosions

Fire and Water

Due to the hazards described above, care and consideration should be applied when considering fire suppression by means of water inundation within energy storage systems. Because water as an extinguishing agent is commonplace, the appropriate use of water should be assessed.



SECTION II: ANNEXES

KCE recommends use of water be limited to defensive firefighting efforts (application of high volumes of water from an appropriate distance applied to the outside of the container and nearby equipment / landscaping). Fire crews may choose to utilize a water stream or fog pattern for defensive firefighting to protect the surroundings or control the path of smoke.

The local fire department should be informed of appropriate fire suppression methods for the energy storage system type as identified by the equipment manufacturer. Coordination with the BESS manufacturer is recommended as this may include water in some cases, and in all scenarios its use should not be discouraged. All such considerations and information will be reviewed during KCE local responder training.

All fire extinguishing equipment, whether automatic or manual, is regularly inspected for functionality as per manufacturers' guidance and required by local fire codes.



SECTION II: ANNEXES

I. ANNEX I – TOXIC GAS RELEASE

Toxic gas releases may be the consequence of abnormal and hazardous conditions and can be indicative of potential issues including a thermal runaway event. The gas is possibly a combustible and inhalation hazard and may ignite at any time.

If gas is known or suspected to be released from a KCE BESS at any time it shall be treated as a fire.

- Evacuate personnel to designated muster location
- Contact the senior KCE representative onsite or, in their absence, dial 911
- Contact the KCE emergency contact phone number posted on-site to inform the ERC
- Prevent non-emergency responder access to the BESS

If a report of gas release from a BESS with no personnel on-site is received, the person receiving the report shall call the Emergency Services Dispatch Number and then the Emergency Contact Number for the site (included in Appendix 5 – Site Information). Appendix 1 - Emergency Response Flow Chart illustrates the required steps.

SECTION II: ANNEXES

J. ANNEX J – MEDICAL EMERGENCY

If an employee is injured, or an accident has occurred on site and first aid is not enough treatment for the emergency, 911 must be called. The call to 911 can be made by phone by any available personnel.

A second notification will be made to Contact the KCE emergency contact phone number posted onsite to inform the ERC.

1. Serious Injury

The following procedures apply for serious medical injuries such as unresponsive subject, bite / sting for personnel who are allergic, bone fractures, neck trauma, or severe burns after 911 has been called.

- On-site personnel shall meet EMS responders at site entrance and direct them to incident location
- Do not leave or move the injured unless directed to by emergency medical service personnel
- Administer first aid if necessary
- The ERC shall inform Human Resources to contact employee's personal emergency contact
- Follow the incident reporting guidelines included in KCE Health, Safety, and Environmental (HSE) Manual

2. Non-Emergency Safety Incident

In the event a safety incident occurs where emergency response is not required (first aid treatment, near miss, etc.) work is to be stopped immediately and reported to the Operations Manager. Risk will be reassessed, adequate controls implemented, and the situation made safe before resuming the task. The Operations Manager shall follow the incident reporting guidelines included in the KCE HSE Manual.

SECTION II: ANNEXES

K. ANNEX K – SEISMIC EVENT

BESS are normally unmanned facilities designed to local codes and standards and therefore have limited exposure to hazards associated with earthquakes.

Earthquakes may strike with little to no advance warning. As such, when an earthquake does occur, it is important to stay as safe as possible. Be aware that some earthquakes are actually fore-shocks, and a larger earthquake may subsequently occur. Also, be aware that many earthquakes are accompanied by aftershocks after the main event has occurred. If an earthquake occurs minimize your movements to a few steps to a nearby safe place until the shaking has stopped. Move away from the enclosures, structures, light poles, and utility wires. If safe to do so, personnel shall take the First Aid kit with them.

Once in the open stay there until the shaking stops to prevent being hit by falling debris.

Following seismic events, the facility will be evaluated by O&M personnel for damage. All repairs will be performed under standard operational procedures.



SECTION II: ANNEXES

L. ANNEX L – HAZARDOUS MATERIAL SPILL

The Project Spill and Prevention Control and Countermeasure Plan (SPCC) provides guidance for pollution prevention and spill response. The Product Safety Data Sheet SDS shall be reviewed, and the area evacuated if necessary. Only properly trained personnel with appropriate PPE shall clean up a spill.



SECTION II: ANNEXES

M. ANNEX M – WORKPLACE VIOLENCE

To ensure a safe work environment for all employees, KCE expressly prohibits any acts or threats of violence by any employee against any other employee, client, vendor, or visitor, or self-inflicted violence, except in extreme cases where self-defense may become necessary. If any behavior is noticed that could be perceived as an act or threat of violence, inform the O&M Manager, who will contact the authorities.



SECTION II: ANNEXES

N. ANNEX N – BOMB THREAT

If a bomb threat is received by phone, email, text, or a handwritten note immediately notify the O&M Manager who will contact 911, or local police department. The O&M Manager shall instruct all personnel to evacuate the facility via the nearest exit.

When ordering an evacuation due to a bomb threat, it is important that employees be trained regarding how to evacuate. If a bomber is nearby and sees everyone conspicuously evacuating a space, they may decide to detonate the device early. Therefore, it is imperative that personnel remain calm and evacuate in an orderly fashion, without drawing any unnecessary attention to themselves or the situation.

If a bomb threat is received by phone:

- Remain calm and keep the caller on the line for as long as possible;
- DO NOT HANG UP, even if the caller does;
- Listen carefully, be polite and show interest;
- Try to keep the caller talking to learn more information;
- If possible, inform a colleague using text, handwritten note, or other discrete methods to call the authorities or, as soon as the caller hangs up, immediately notify them yourself;
- If your phone has a display, copy the number and/or letters on the window display;
- Complete the Bomb Threat Checklist in the appendices of this plan;
- Write down as much detail as you can remember, trying to get exact words;
- From a different phone, contact authorities immediately with information and await instructions.

If a bomb threat is received by handwritten note:

- Notify the O&M Manager who will contact 911, or local police department;
- Handle the note as minimally as possible. Do not throw it away;
- Turn the note over to authorities upon request when they arrive.

If a bomb threat is received by e-mail:

- Notify the O&M Manager who will contact 911, or local police department;
- Do not delete the message or forward it to anyone else unless directed to do so by FIRE/EMS authorities.

If a bomb threat is perceived due to seeing a suspicious package evident by:

- no return address
- excessive postage
- stains
- strange odor
- strange sounds
- unexpected delivery
- poorly handwritten
- misspelled words
- incorrect titles

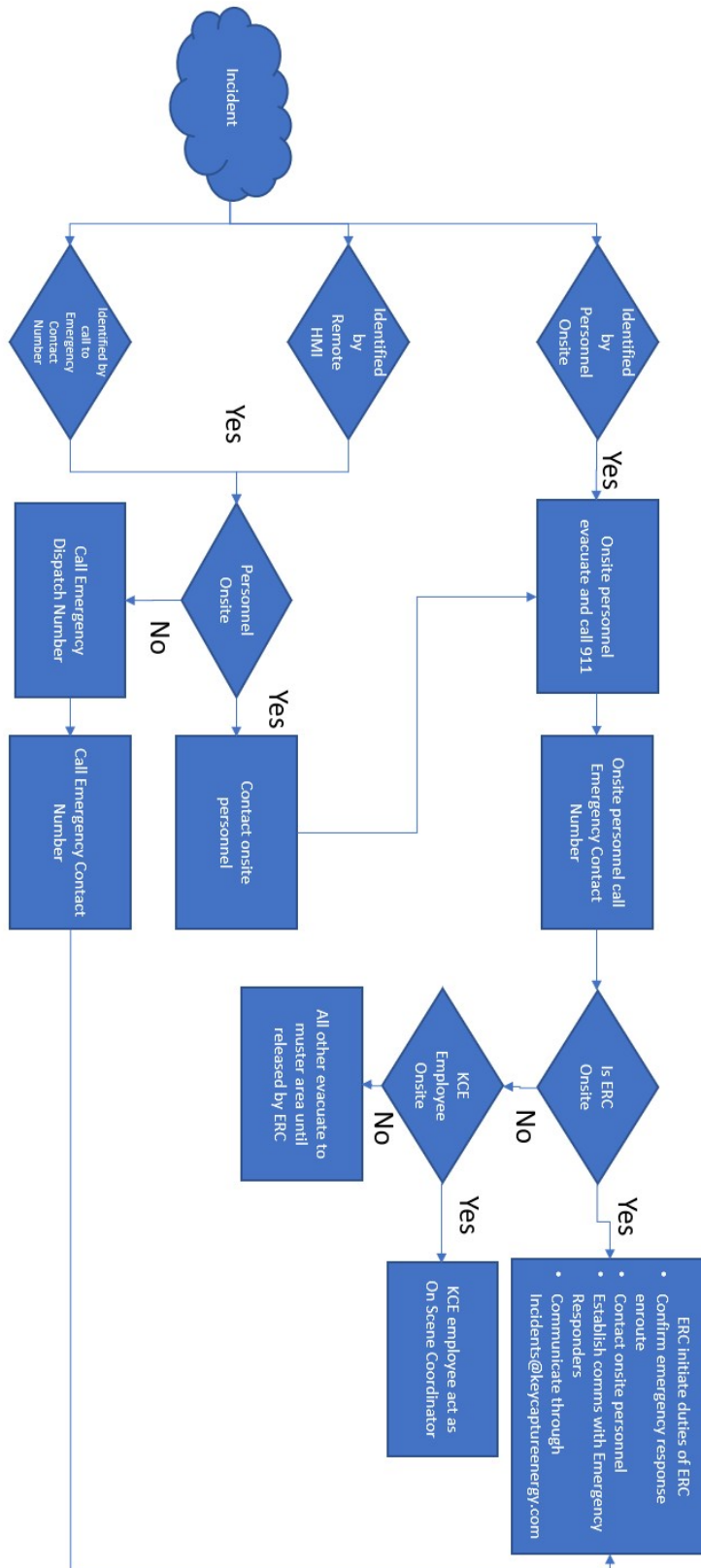


SECTION II: ANNEXES

- foreign postage
 - restrictive notes
- Notify the O&M Manager who will contact 911, or local police department;
- Do not use two-way radios or cell phone as radio signals have the potential to detonate a bomb;
- Do not touch or move a suspicious package;
- As soon as the danger has passed, an authorized “all-clear” will be issued and personnel will be allowed to return to the facility.

SECTION III: APPENDICES

APPENDIX 1 – RESPONSE FLOWCHART



SECTION III: APPENDICES

APPENDIX 2 – CHECKLISTS

For each checklist item:

- If the item inspected is satisfactory, check the OK box;
- If a deficiency is identified, complete the Comments section and indicate the Action Taken;
- If the item does not apply, check the N/A box.

Emergency Response	<i>OK</i>	<i>N/A</i>	<i>Action Taken / Comments</i>
Facility evacuated, if required			
Emergency responders en route, if required			
Communications established with emergencyresponders			
BESS disconnected from grid, if required			
Crisis communications plan initiated, if required			
Other			

Emergency Response Planning	<i>OK</i>	<i>N/A</i>	<i>Action Taken / Comments</i>
Emergency response plans (including importantphone numbers) written and available			
Training provided and drills performed for persons required to implement emergencyresponse			
Housekeeping maintained to ensure egress paths are clear and no missile hazards exist inperiods of high winds			
Site work cancelled in advance of extreme weather			
ROC informed of potential for extreme weather			

Fire & Explosion Prevention	<i>OK</i>	<i>N/A</i>	<i>Action Taken / Comments</i>
Fire extinguishers inspected monthly and servicedby contractor annually			
Emergency telephone number posted in clearand conspicuous locations			
Trash is removed at least daily from building			
Fire, smoke, H2 detection systems and HVAC inspected and serviced			
Exterior locations free of trash and combustible debris			

SECTION III: APPENDICES

APPENDIX 3 – BOMB THREAT CHECKLIST

Bomb Threat Checklist			
Date:		Time:	
Time Caller Hung Up:		Phone # Where Call Received:	
Ask Caller:			
Where is the bomb located? (Building, floor, room, etc.):			
When will it go off?			
What does it look like?			
What kind of bomb is it?			
What will make it explode?			
Did you place the bomb? Yes No Why?			
What is your name?			
Exact Words of Threat:			
Information About Caller:			
Where is the caller located? (background/level of noise)			
Estimated age:			
Is voice familiar? If so, who does it sound like?			
Other points:			
Caller's Voice		Background Sounds	
<input type="checkbox"/> Female <input type="checkbox"/> Male <input type="checkbox"/> Accent <input type="checkbox"/> Angry <input type="checkbox"/> Calm <input type="checkbox"/> Clearing throat <input type="checkbox"/> Coughing <input type="checkbox"/> Cracking voice <input type="checkbox"/> Crying <input type="checkbox"/> Deep <input type="checkbox"/> Deep breathing <input type="checkbox"/> Disguised <input type="checkbox"/> Distinct	<input type="checkbox"/> Excited <input type="checkbox"/> Laughter <input type="checkbox"/> Lisp <input type="checkbox"/> Loud <input type="checkbox"/> Nasal <input type="checkbox"/> Normal <input type="checkbox"/> Ragged <input type="checkbox"/> Rapid <input type="checkbox"/> Raspy <input type="checkbox"/> Slow <input type="checkbox"/> Slurred <input type="checkbox"/> Soft <input type="checkbox"/> Stutter	<input type="checkbox"/> Animal noises <input type="checkbox"/> House noises <input type="checkbox"/> Kitchen noises <input type="checkbox"/> Street noises <input type="checkbox"/> Booth <input type="checkbox"/> PA system <input type="checkbox"/> Conversation <input type="checkbox"/> Music <input type="checkbox"/> Motor <input type="checkbox"/> Clear <input type="checkbox"/> Static <input type="checkbox"/> Office machinery <input type="checkbox"/> Factory machinery <input type="checkbox"/> Local <input type="checkbox"/> Long Distance	<input type="checkbox"/> Incoherent <input type="checkbox"/> Message read <input type="checkbox"/> Taped message <input type="checkbox"/> Irrational <input type="checkbox"/> Profane <input type="checkbox"/> Well-spoken
Other Information:			

SECTION III: APPENDICES

APPENDIX 4 – CONTACT INFORMATION

Organization	Contact	Phone	Description
TBD	TBD		Remote Operations Center
KCE	Erika Nelson	Redacted	Head of Project Operations
KCE	TBD		CT O&M Manager
KCE	Robert Tepp	Redacted	Director of HESQ
KCE	Jeff Bishop	Redacted	CEO
KCE	Jim Brown	Redacted	Interim Head of Construction
KCE	John Bresnahan	Redacted	CFO
KCE	Rachel Goldwasser	Redacted	Head of Legal & Regulatory
KCE	Bob Garrett	Redacted	Compliance Manager
KCE	Joel Turkheimer	Redacted	Head of Market Development
KCE	Shaun Boggs	Redacted	Head of IT & Cybersecurity
TBD	TBD		HVAC provider and technician – emergency contact
TBD	Outages & Hazards		Distribution Service Provider – emergency contact

SECTION III: APPENDICES

APPENDIX 5 – SITE RELATED INFORMATION

KCE CT 5, LLC

Site Location

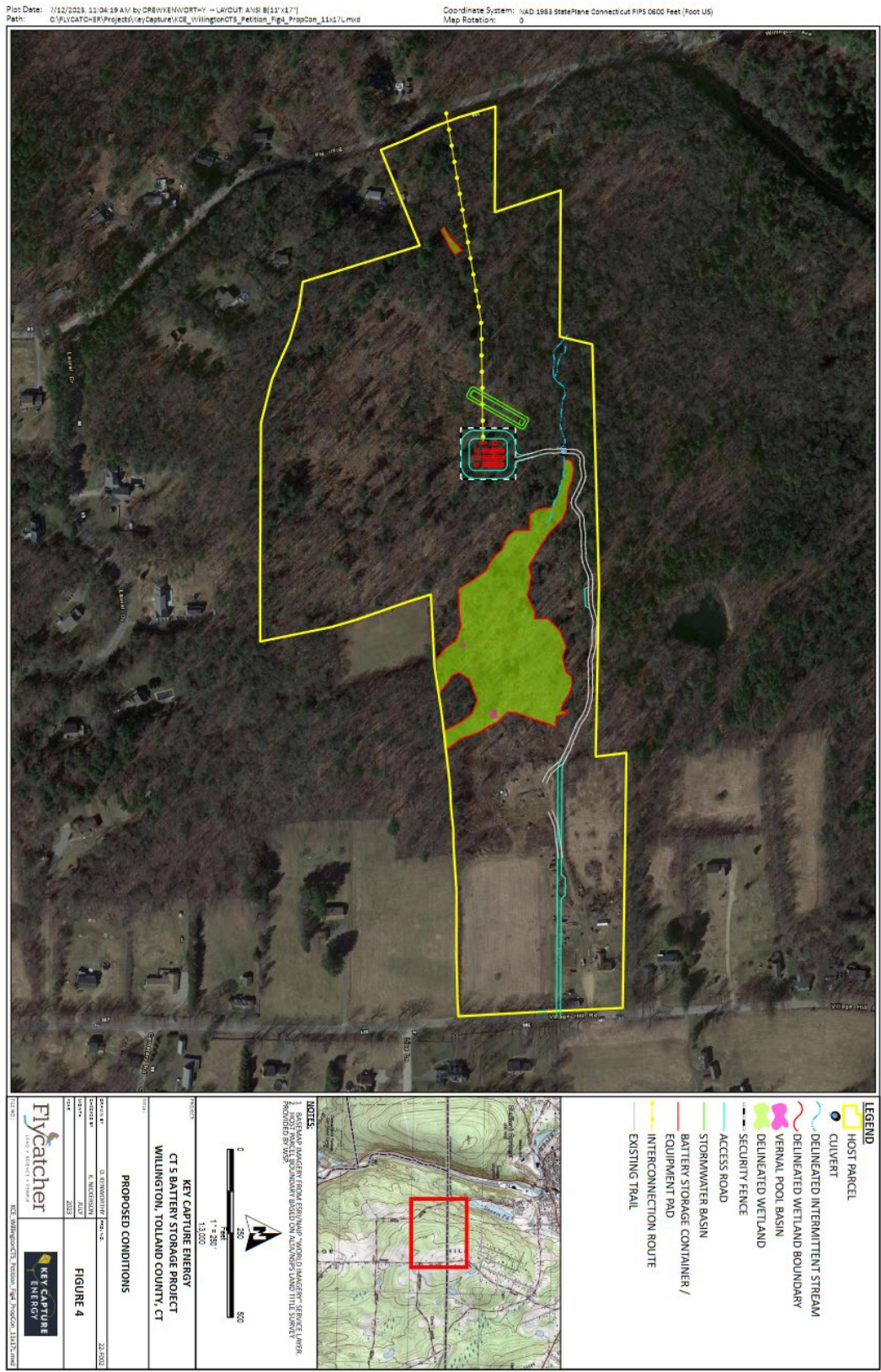
The KCE CT 5 ESS facility is located at Village Hill Road, Willington, CT 06279, coordinates: 41.940494, -72.297037. The parcel upon which the project will be located does not currently have a street address. KCE CT 5, LLC will file for a 911 address upon approval of permits. The site consists of twelve (12) Sungrow ST2752UX-US ESS units and two (2) Sungrow SC3150-MV-US inverters / power conversion systems (PCS) providing a total of approximately 5.335 MW / 21.34 MWh of energy storage power and capacity, respectively.

As shown in Figure 1 below, all ESS units and associated electrical equipment are surrounded by protective fencing with one (1) access gate. An access road will be built upon an existing woods road as indicated in the plans.

The site is not located in a Special Flood Zone (AE or E).

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Figure 1



SECTION III: APPENDICES

*** **911** should be used during an emergency ***

Emergency Services, Willington and surrounding area		
<u>Willington Fire Department</u>		
Organization	Address	Phone
General Emergency		911
Non-Emergency		(860) 875-2543
Willington Fire Marshall	Trevor Gantick	
Fire Marshal/Burning Official	40 Old Farms Rd. Willington CT 06279	(860) 429-7757
Willington Fire Dept. Inc. #1	Station 1, 426 River Rd. Willington CT 06279	(860) 429-0288
Willington Fire Dept. Inc. #1	Station 2, 143 River Rd. Willington CT 06279	(860) 429-5737
Willington Hill Fire Department	24 Old Farms Rd. Willington CT 06279	(860) 429-2993
<u>Police</u>		
Organization	Address	Phone
General Emergency		911
Non-Emergency		(860) 896-3200
Sheriff	(Tolland Co.)	(860) 872-8373
State Police	(Troop C)	(860) 896-3200
<u>Medical Services</u>		
Organization	Address	Phone
General Emergency		911
CT Children's Hospital	282 Washington St. Hartford CT	(860) 545-9000
Day Kimball Hospital	320 Pomfret St. (rte 44) Putnam CT	(860) 928-6541
Hartford Hospital	80 Seymour St. Hartford CT	(860) 545-5555
Johnson Memorial Hospital	201 Chestnut Hill Rd. Stafford Springs CT	(860) 684-4258

SECTION III: APPENDICES

Rockville General Hospital	31 Union St. (Rte 74) Vernon CT	(860) 872-0501
Saint Francis Hospital	114 Woodland. Hartford CT	(860) 714-4000
Windham Hospital	112 Mansfield Ave. Willimantic CT	(860) 456-9116
<u>Other Emergency Services</u>		
Organization	Phone	
Poison Control Center	(800) 343-2722	
Public Health Emergency	(860) 509-8000	

Connecticut Poison Control Center

Phone 1-800-222-1222

SECTION III: APPENDICES

APPENDIX 6 – Hot/Cold Weather Operations Plans

The facility's interior access roads shall be maintained to ensure accessibility to the site by emergency personnel, especially during inclement weather. Key Capture Energy shall ensure that snow removal is completed as soon as possible following a winter storm event. The rest of this section will not be applicable until the project is fully operational.

System Manual

Battery Energy Storage System

PowerTitan-ST2752UX-US/ST2695UX-US/
ST2637UX-US/ST2580UX-US/ST2523UX-US/
ST2465UX-US/ST2408UX-US/ST2351UX-US/
ST2293UX-US



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About This Manual

This manual describes the transportation and storage, mechanical installation, electrical connection, power-on and power-off operation, LCD operation, troubleshooting, and maintenance of the BESS.

Target Group

This manual is for operators of the power storage plant and qualified technical personnel.

The BESS must and can only be installed by professional technicians who meet the following requirements:

- Has been trained
- Read this manual thoroughly and understand the safety instructions related to operations
- Be familiar with local standards and relevant safety regulations of electrical systems

How to Use This Manual

Please read this manual carefully before using the product and keep it properly at a place for easy access.

Contents of the manual may be updated and amended continuously, so it is possible that there may be some errors or slight inconsistency with the actual product. Please refer to the actual product purchased, and the latest manual can be obtained from support.sungrowpower.com or sales channels.

Symbol Explanations

To ensure the safety of the users and their properties when they use the product and to make sure that the product is used in an optimal and efficient manner, this manual provides users with the relevant safety information highlighted by the following symbols.

Below is a list of symbols that are used in this manual. Review them carefully to make better use of this manual.

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a moderately hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION

Indicates a slightly hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

Indicates a potential hazard which, if not avoided, will result in device malfunction or property damage.



“NOTE” indicates additional information, emphasized contents or tips that may be helpful, e.g., to help you solve problems or save time.

Symbol on Products

Always note hazard warnings on the machine body, including:

Marks	Explanation
	High voltage inside! Risk of electric shock by touching it!
	This symbol indicates a protective ground terminal which needs to be firmly grounded to ensure the safety of operators.
	Read the instructions before performing any operation on the product.
	Live parts! Do not touch them until 5 minutes after disconnection from the power sources.
	Pay attention to the danger. Do not operate this product in the live status!
	Pay attention to heavy objects. Lifting of heavy objects may lead to back injuries. Please lift heavy objects with appropriate tools.
	Pay attention to explosion.
	Pay attention to corrosion.
	Do not dispose of this product as household waste.
	No fire.
	There should be a medical center nearby.
	In case of contact with eyes, rinse the eyes immediately with running water or normal saline; and seek medical help in time.
	It is required to wear goggles.

Abbreviations

Complete designation	Abbreviations
Battery Energy Storage System	BESS
Energy Storage System	ESS
Battery Connection Panel	BCP
Battery Supply Panel	BSP
Power Conversion System	PCS
DC/DC Converter	DC/DC
Fire Suppression System	FSS
SCADA (Supervisory Control And Data Acquisition) System	SCADA System
Liquid Cooling System	LCS
Local Controller	LC
Energy Management System	EMS
Switching Mode Power Supply	SMPS
Battery Module	BM (also referred to as PACK)
Battery Cluster	BC (also referred to as PACK)
Battery Management Unit	BMU
Battery Cluster Management Unit	BCMU (collectively referred to as CMU)
Battery System Management Unit	BSMU (collectively referred to as SMU)
Battery Management System	BMS
State Of Charge	SOC
State Of Energy	SOE
State Of Health	SOH
State Of Safety	SOS

Unless otherwise specified, devices in this manual are referred to as the abbreviations above.

Note

In order to provide customers with the best usage experience, the products and product manuals are always in the process of improvement and upgrade. If the manual received is slightly inconsistent with the product, it may be a result of product version upgrade, and the actual product shall prevail.

The figures in this manual are for reference only. The actual product received may differ.

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1 Safety Precautions

1.1 Personnel Requirements

The hoisting, transportation, installation, wiring, operation, and maintenance of the BESS must be carried out by professional electricians in accordance with local regulations. The professional technician is required to meet the following requirements:

- Know electronic, electrical wiring and mechanical expertise, and be familiar with electrical and mechanical schematics.
- Be familiar with the composition and working principles of the BESS and its front- and rear-level equipment.
- Have received professional training related to the installation and commissioning of electrical equipment.
- Be able to quickly respond to hazards or emergencies that occur during installation and commissioning.
- Be familiar with the relevant standards and specifications of the country/region where the project is located.

1.2 Electrical Safety

DANGER

- **Touching the power grid or the contact points and terminals in the devices connected to the power grid may lead to electric shock!**
- **The battery side or the power grid side may generate voltage. Always use a standard voltmeter to ensure that there is no voltage before touching.**

DANGER

Lethal voltages are present inside the device!

- **Note and observe the warnings on the product.**
- **Respect all safety precautions listed in this manual and other pertinent documents.**
- **Respect the protection requirements and precautions of the lithium battery.**

⚠ DANGER

Electricity may still exist in the battery when the power supply of the BESS is disconnected. Wait 5 minutes to ensure the equipment is completely voltage-free before operating.

⚠ WARNING

All operations, such as hoisting, transportation, installation, wiring, operation, and maintenance must comply with the relevant codes and regulations of the region where the project is located.

⚠ WARNING

Always use the product in accordance with the requirements described in this manual. Otherwise, equipment damage may occur.

NOTICE

To prevent misuse or accidents caused by unrelated personnel, observe the following precautions:

- **Post prominent warning signs around the BESS to prevent accidents caused by false switching.**
- **Place necessary warning signs or barriers near the product.**

1.3 Battery Safety

For safe use of the product, the technician should carefully read and strictly observe the safety requirements. The Company shall not be liable for product functional abnormality, component damage, personal safety accident, property loss, or other damage caused by the following reasons:

- The batteries are not charged as required, resulting in capacity loss or irreversible damage to the batteries.
- A battery is damaged, falls, or leaks due to improper operations or failure to operate the battery as required.
- The batteries are not powered on in time, which causes damage to the batteries due to overdischarge.
- The damage is caused to batteries due to the use of improper equipment for charging and discharging.
- Batteries are frequently overdischarged due to improper maintenance, capacity is incorrectly expanded, or the batteries have not been fully charged for a long time.
- Battery operation parameters are incorrectly set.

- Damage is caused to batteries because the battery operating environment does not meet the requirements.
- The customer uses the batteries beyond the scenarios specified in this manual, including but not limited to connect extra loads.
- Batteries are not maintained based on the system manual.
- The product is damaged due to the customer's continued use of batteries beyond the warranty period.
- The product is damaged due to the use of defective or deformed batteries.
- Use batteries provided by the Company with other batteries, including but not limited to batteries of other brands or batteries of different rated capacities.
- Product damage or property loss are caused due to storing or installing batteries with flammable/explosive materials.
- Personal safety accidents and property loss are caused by battery-related operations performed by non-professional personnel, or by not wearing qualified protective equipment during operations.
- The battery is damaged due to eating, drinking, smoking and other behaviors near the battery.
- Batteries are stolen.

1.4 Hoisting and Transportation

WARNING

Follow the procedures for working at heights when walking on the top of a container.

1.5 Installation and Wiring

WARNING

In the whole process of mechanical installation, the relevant standards and requirements of the project location must be strictly observed.

WARNING

Only equipment designated by SUNGROW ENERGY STORAGE TECHNOLOGY CO., LTD. (hereinafter referred to as "SUNGROW") can be used. Failure to use equipment designated by SUNGROW may cause damage to the protection function and injury to personnel.

1.6 Operation and Maintenance

WARNING

Personal protective equipment is required for maintenance and service of the BESS.

Maintenance personnel must wear protective equipment such as goggles, helmets, insulated shoes, gloves, etc.

WARNING

There are no user-maintainable parts inside the battery unit.

Only personnel approved by SUNGROW can remove, replace and dispose of the batteries. Users are not allowed to maintain batteries without guidance.

WARNING

To avoid electric shock, do not perform any other maintenance operations beyond those described in this manual.

If necessary, contact Sungrow Customer Service for maintenance.

WARNING

To ensure continuous fire protection, replacement of internal components should only be performed by professional personnel.

DANGER

Dismantling or burning the battery may cause it to catch fire.

NOTICE

Do not spray paint any internal or external component of the product.

Do not use cleaning agents to clean the product or expose it to harsh chemicals.

WARNING

Protective tools such as goggles are required when carrying out coolant (glycol solution) or liquid cooling pipeline maintenance.

2 Product Description

2.1 Product Introduction

PowerTitan is mainly used in large and medium-sized energy storage power plants. It adopts standard BESS design and modular design to realize the integration of energy storage system. Through liquid cooling method, it can better balance the system temperature. Through the combination of power storage equipment, power conversion equipment and electronic devices, together with intelligent operation and maintenance, it contributes to easier installation and O&M. Through systematic safety design, it ensures a more efficient battery performance and longer service life.

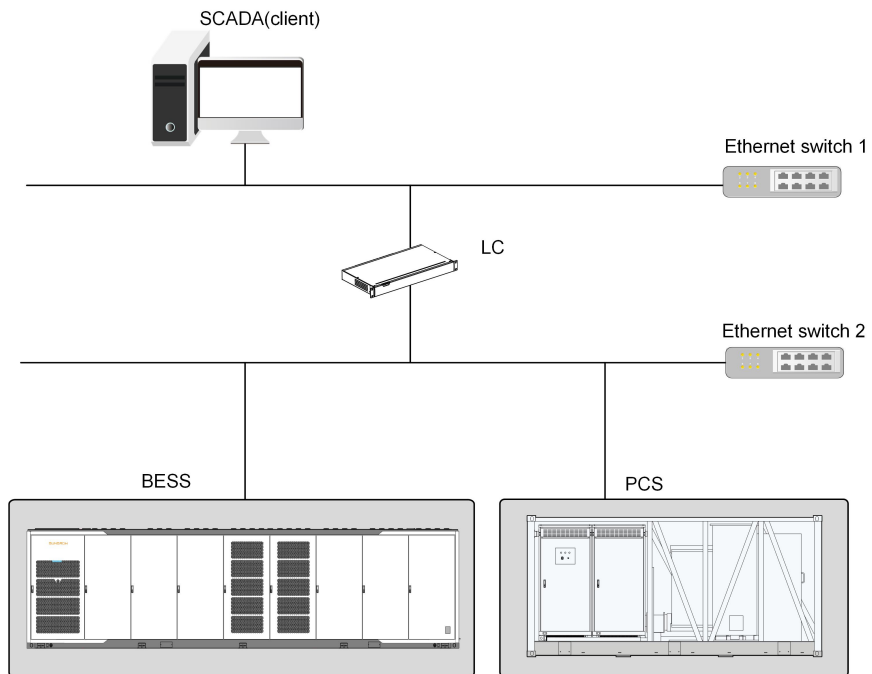


figure 2-1 System networking diagram

2.2 External Design

2.2.1 Container Appearance

The appearance of BESS is shown in the following figure:

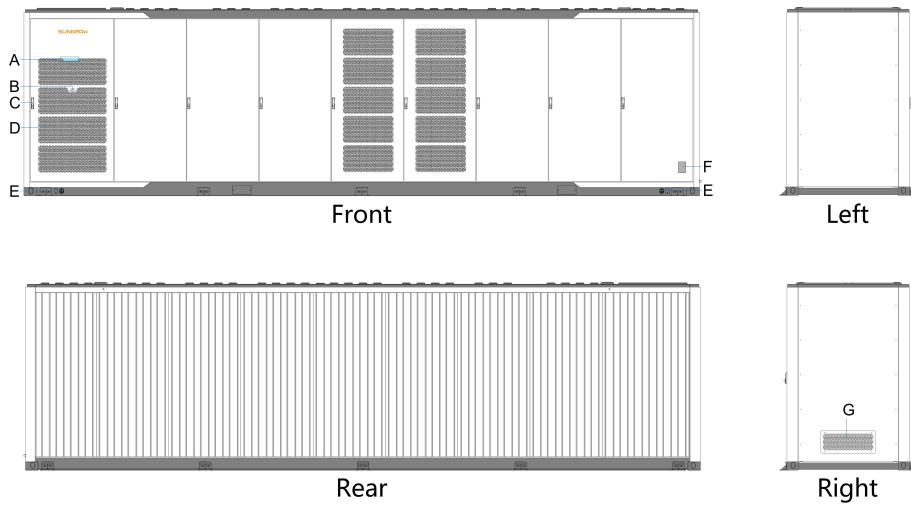


figure 2-2 Appearance

No.	Name
A	LED indicator
B	Emergency stop button
C	Door lock
D	Air inlet
E	Grounding point
F	Nameplate
G	Air inlet for fire suppression system

* The figure is for reference only. The product received may differ.


NOTICE



The nameplate contains important parameter information related to the BESS, and shall be protected during transportation, installation, maintenance and troubleshooting. It is strictly prohibited to damage or dismantle the nameplate.

LED Indicator

The LED indicators are located at the top of the monitoring window. Colors and status of indicators are explained below.

table 2-1 Indicator status

Status	Description
 Steady on	The system works normally (- charge and discharge)

Status		Description
	2S periodic slow blinking (Breathing light)	The system is normal, no charging and discharging.
	Off	A fault occurs (auxiliary circuit breaker does not trip)
	Off	Auxiliary circuit breaker trips

Emergency Stop Button

In case of emergency, press this button to disconnect the electrical connection inside the BESS.

2.2.2 Mechanical Parameters

Dimensions

The external dimensions of the container are shown in the figure.

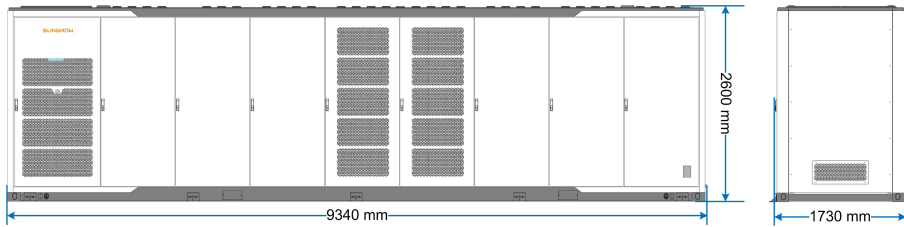


figure 2-3 Dimensions of BESS

*The figure is for reference only and the actual product shall prevail!

The clearance space

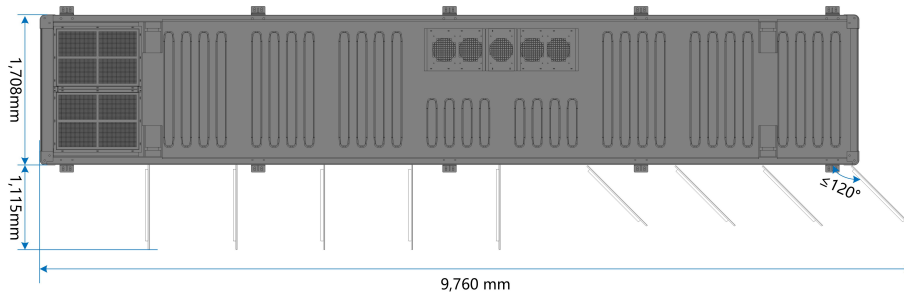


figure 2-4 The diagram of the required space when the door is opened

*The figure is for reference only and the actual product shall prevail!

2.2.3 Ventilation Design

The BESS intakes air from the front side and expels it from the top, as shown below.

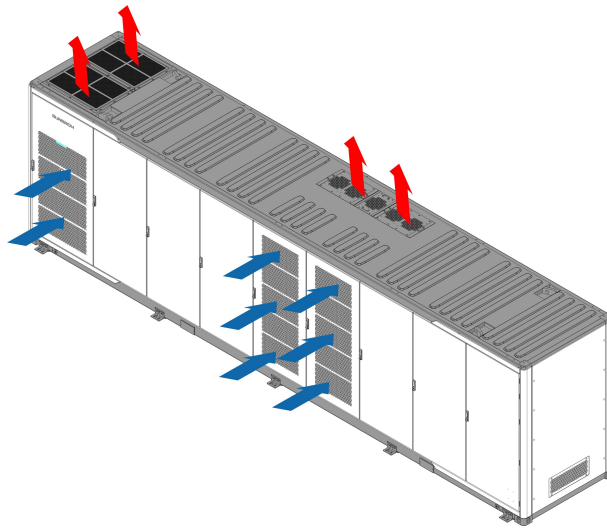


figure 2-5 Schematic diagram of ventilation

*The figure is for reference only and the actual product shall prevail!

2.3 Internal Design

2.3.1 Internal Equipment

The main electrical equipment in the BESS is shown in the figure below.

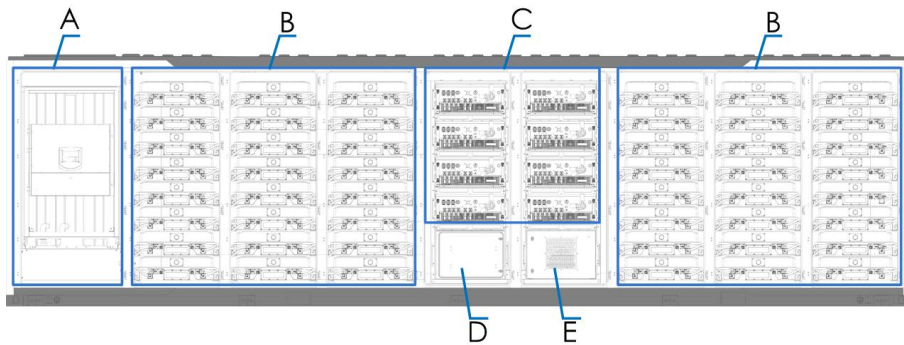


figure 2-6 Internal Equipment

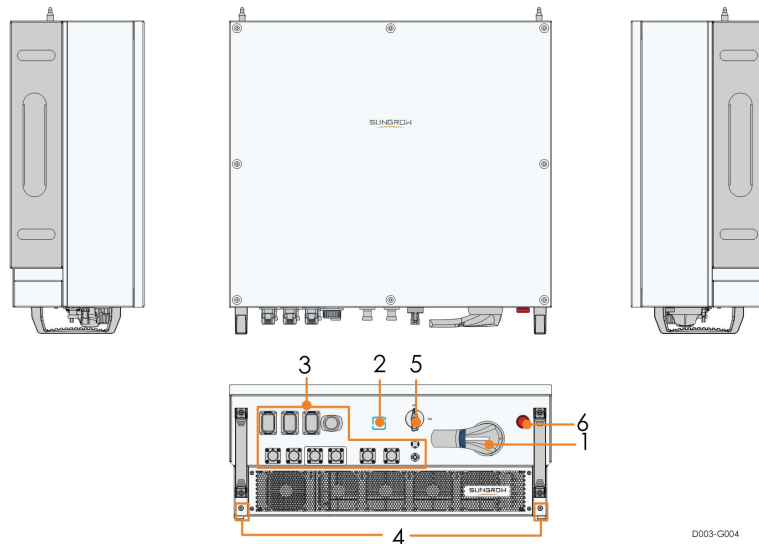
* The figure is for reference only. The product received may differ.

No.	Name
A	LCS
B	Rack
C	DC/DC
D	BSP
E	BCP

2.3.2 DC/DC

Product Appearance

The DC/DC is shown in the figure below.



D003-G004

figure 2-7 Product Appearance






* The image shown here is for reference only. The actual product received may differ.

No.	Name	Description
1	DC Switch	To safely stop the power conversion between the DC/DC and the inverter.
2	LED indicator	To indicate the current working status of the DC/DC.
3	Wiring area	Including DC side terminals and communication terminals.
4	Grounding terminal	For protective grounding of the equipment.
5	Auxiliary power switch	To safely cut off the electrical connection between the DC/DC and PV modules.
6	Emergency stop button	Only for emergencies. Press this button to immediately shut down the device.

LED Indicator Panel

This panel is for users to check the current working status of the DC/DC.

table 2-2 LED indicator status description

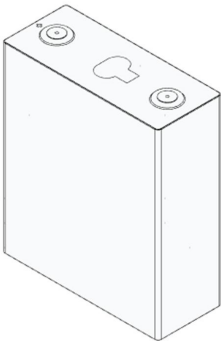
Indicator	Status	Status description
	Steady on	DC/DC is in operation.
	Fast blinking (Interval: 0.2s)	Bluetooth is connected and there is data communication;
		No fault is detected.
Blue	Slow blinking (Interval: 2s)	The DC/DC is powered on, and is in the emergency stop state, standby state or start-up state.
	Steady on	A fault occurred (The DC/DC shuts down immediately).
	Quick blinking (Interval: 0.2s)	Bluetooth is connected and there is data communication;
Red		A fault occurred.
	Off	The DC/DC is powered off.
Off		

2.3.3 Battery

Standardized and unitized battery modules are developed based on lithium-iron cells. The battery clusters are connected with DC/DC in series, then DC/DC are connected in parallel in battery side to the supporting power conversion system (PCS) to form energy storage systems(ESS) and store and release electric energy.

Cell

table 2-3 Cell parameters

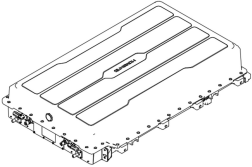
Cell	Parameter	Value
	Size (thickness * height * width)	71.7 ± 0.8 mm * 207.2 ± 0.8 mm * 173.9 ± 0.8 mm
	Weight	5.34 ± 0.2 kg
	Rated capacity	280 Ah
	Rated energy	896 Wh
	Rated voltage	3.2 V

Cell	Parameter	Value
	Voltage range	2.5 V~ 3.65 V (Cell temperature T>0°C) 2.0 V~ 3.65 V (Cell temperature T≤0°C)

LFP Battery Module

The LFP battery module is mainly composed of cells in series. The dedicated cells are used for battery management. Control commands are received by means of daisy chain communication, and the collected data is reported.

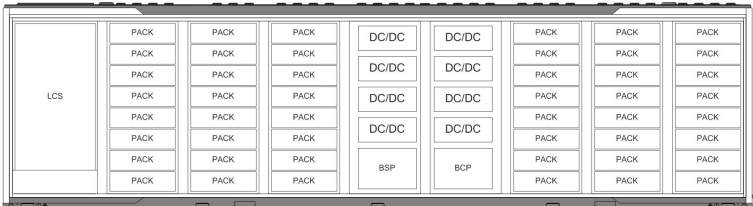
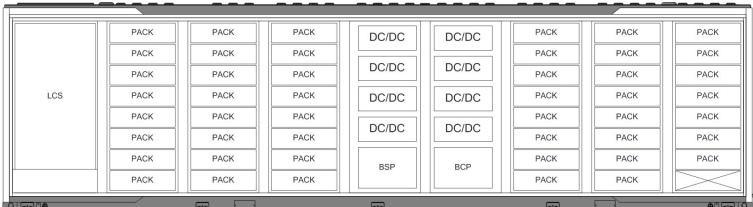
table 2-4 LFP battery parameters

LFP battery module	Parameter	Value
	Model	P573-111 / P573B-111
	Size (W*H*D (Without terminals, spigots))	(868 ± 5 mm) * (247 ± 5 mm) * (1415 ± 5 mm)
	Multiplying power	≤0.5C
	Cell type	Prismatic aluminum shell LFP
	Combination	1P64S
	Key components	64 cells, 1 BMU and 1 fuse
	Weight	(395±12) kg
	Ingress protection	IP65

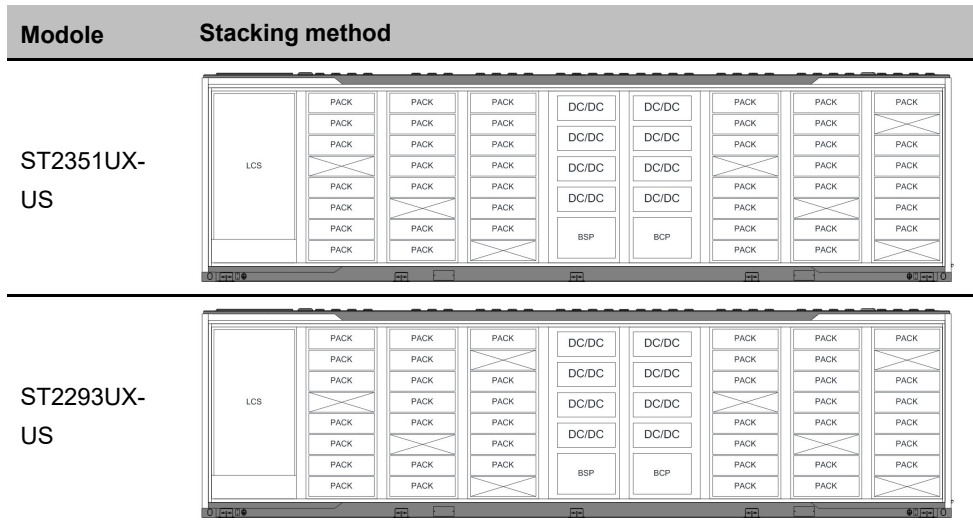
Battery Cluster

The battery cluster is composed of multiple PACKS in series, fuse, etc.

table 2-5 Battery cluster stacking method

Module	Stacking method
ST2752UX-US	
ST2695UX-US	

Module	Stacking method
ST2637UX-US	
ST2580UX-US	
ST2523UX-US	
ST2465UX-US	
ST2408UX-US	



Note: x means no equipment, PACK means battery module, DC/DC means DC converter.

2.3.4 Cable Entry Design

The cables between the BESS and external equipment are routed from the bottom of the BESS. Take measures to protect all cables of the BESS, such as laying cable protection tubes, to prevent rodents from damaging the cables. The cable inlet and outlet holes on bottom of the BESS are shown in the figure below.

Drill holes for cable entry based on on-site cable routing.

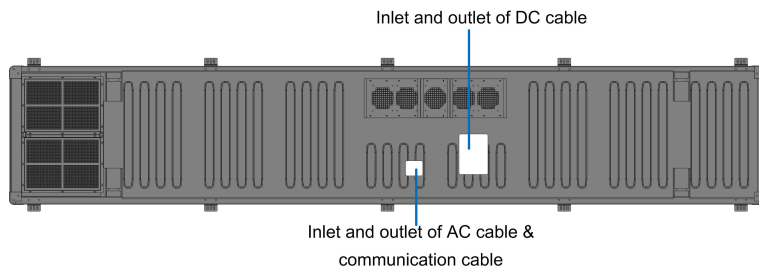


figure 2-8 Schematic diagram of bottom cable inlet and outlet (top view)

* The figure is for reference only. The product received may differ.

3 Transport and Storage

3.1 Precautions

⚠ WARNING

Failure to transport and store the product in accordance with the requirements in this manual may invalidate the warranty.

3.2 Transport Methods

BESS can be transported by road, sea, and rail. The BESS is highly integrated and easy to hoist, which facilitates its transport. Currently, BESS is not permitted for air transport and there is no specific guidance on rail transport.

BESS leaves its manufacturing factory by truck. While domestic shipments can be made using only trucks, cross-country shipments usually require a combination of truck-ship-truck transport. In this case, the cargo needs to be transferred from the truck to the ship at or near the port of destination and vice versa.

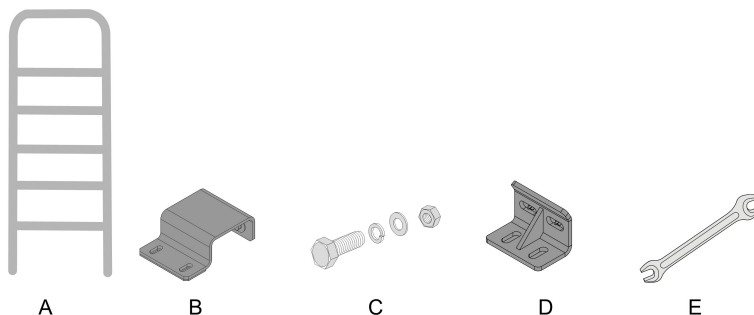
NOTICE

In most cases, the total weight of the truck and the cargo exceeds the limits allowed by general roads. In such cases, an overweight permit from the country or region of transport may be required.

3.3 Crating Before Transport

Since the BESS container is not a standard size, it is required to put the container into SUNGROW's special standard container frame before shipping.

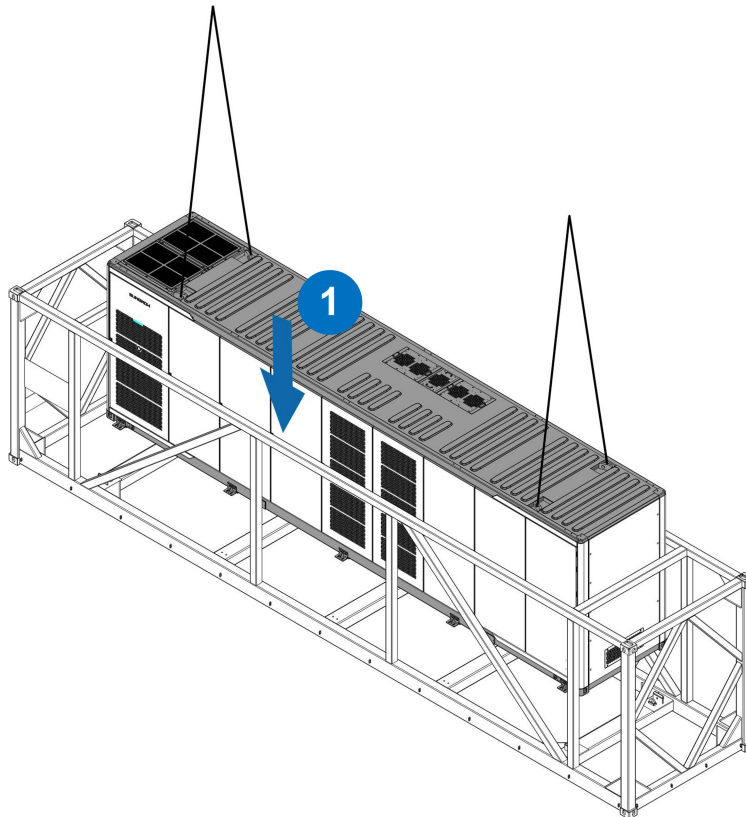
Tool Preparation



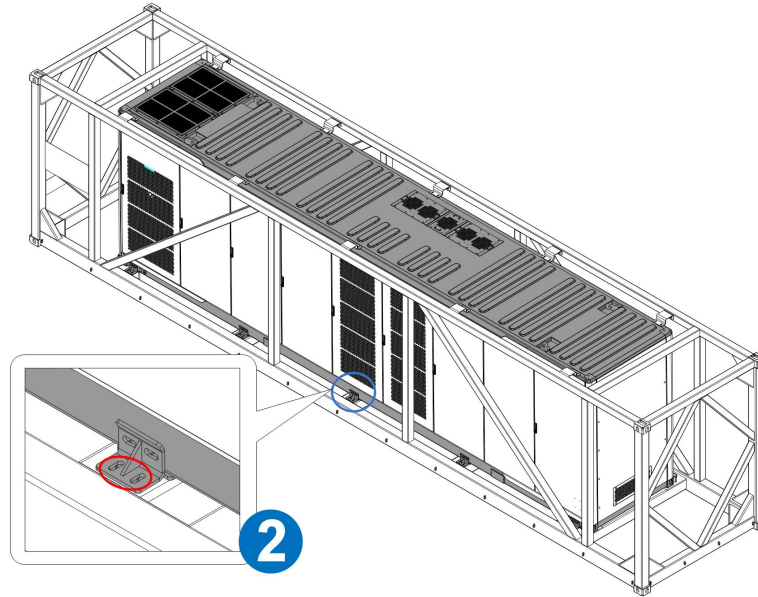
No.	Name	Component source
A	Ladder, at least 2 meters long	Not included in the scope of supply.
B	The corner fittings	Included in the scope of supply.
C	Screws(M12x30)	Included in the scope of supply.
D	L-shaped angle steels	Included in the scope of supply.
E	Wrench	Not included in the scope of supply.

Installation Method

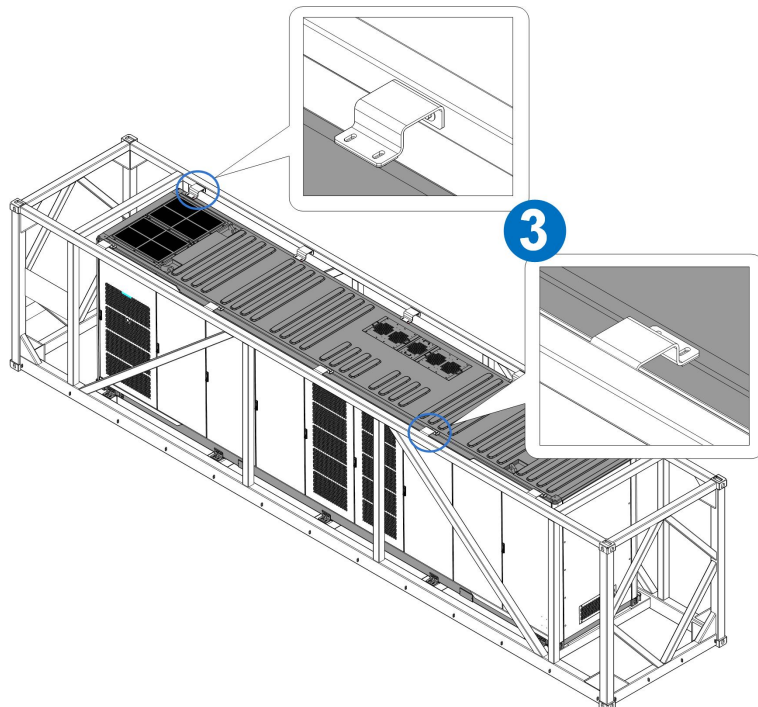
step 1 Hoist BESS into the transport frame.



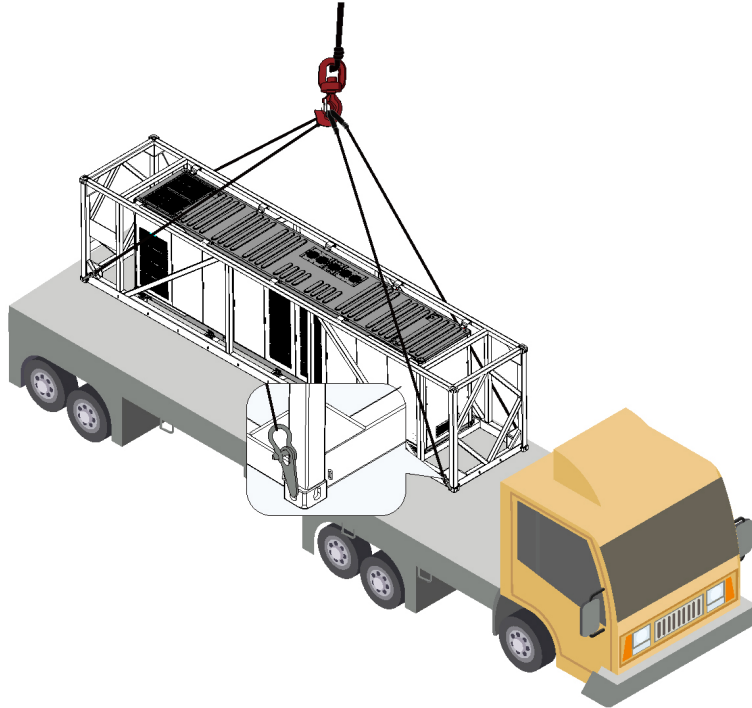
step 2 Fix the bottom of BESS to the bottom of the transport frame using M12x30 bolts and L-shaped angle steel with a recommended torque of 60~70 N·m.



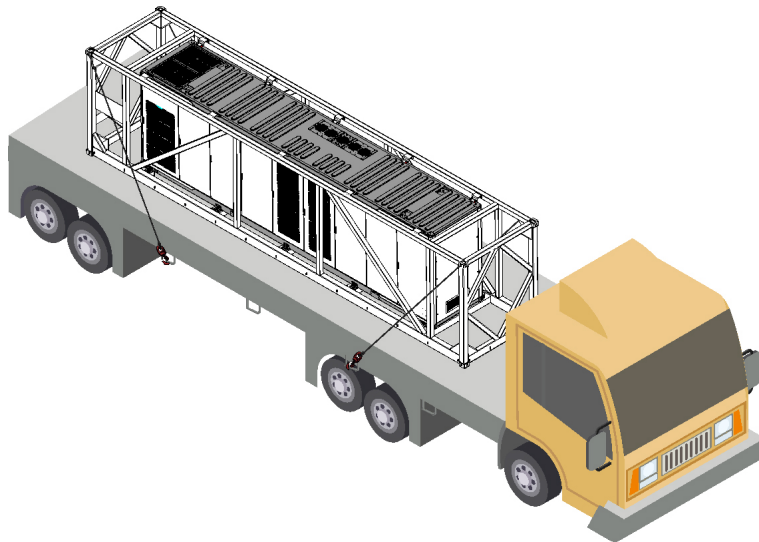
step 3 Fix the top of BESS to the top of the transport frame using M12x30 bolts and corner fittings with a recommended torque of 60~70 N·m.



step 4 Use a crane to lift the BESS into the truck.



step 5 Secure the BESS to the truck.



-- End

3.4 Requirements for Transportation

- Choose appropriate means of transportation according to the size and weight of the product.
- Place the product horizontally during transportation.

- Take measures to avoid collision or strong shock during transportation.
- Pay attention to the lane width, slope, etc. during road transportation. Pay attention to whether the road surface is smooth
- Waterway requirements: waterways should meet the requirements of ship full-load sailing.
- It is recommended to transport the battery by vehicle or ship. During transportation, the battery should be shielded from the sunlight. During loading and unloading, the PACK should be handled gently and avoid throwing, rolling and putting heavy pressure on it. Avoid mechanical impact and direct contact with rain and snow during transportation.

3.5 Unpacking on Arrival

Tool Preparation



A

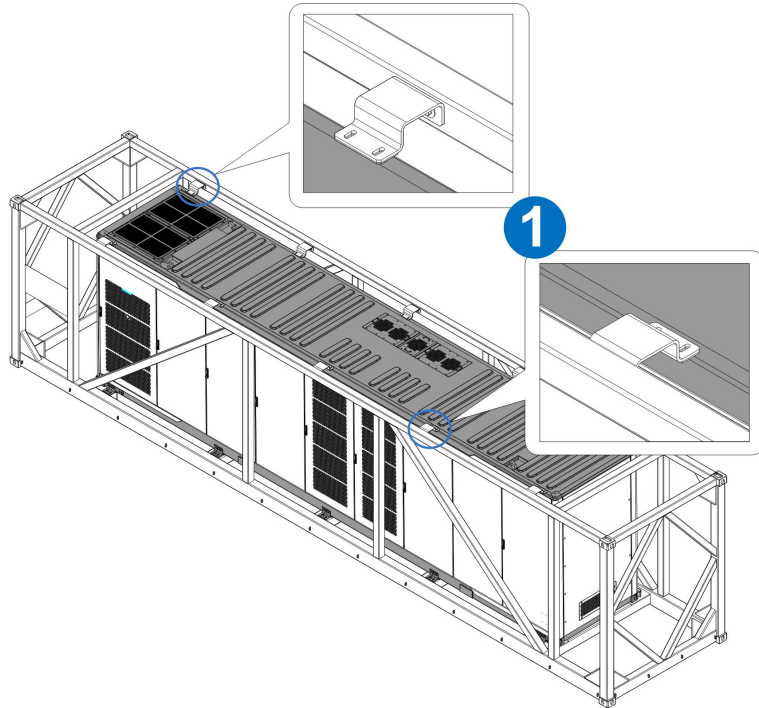


B

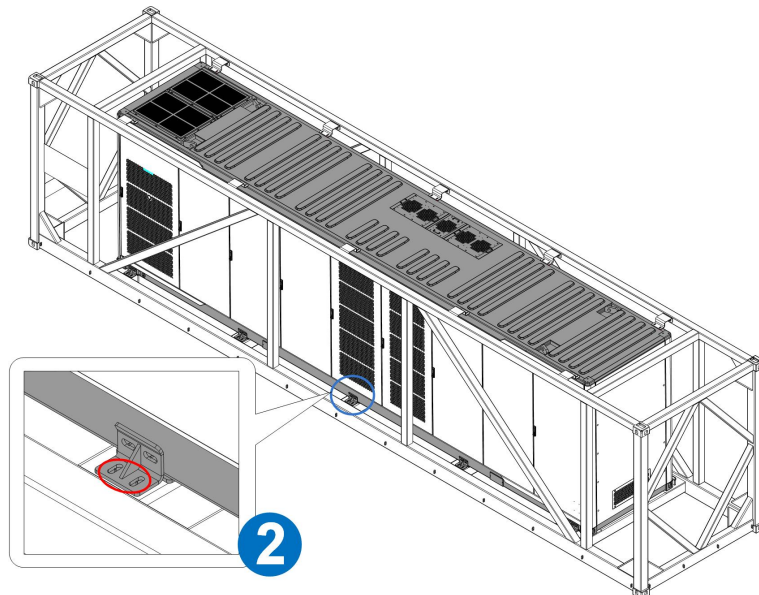
No.	Name	Component source
A	Ladder, at least 2 meters long	Not included in the scope of supply.
B	Wrench	Not included in the scope of supply.

Unpacking Steps

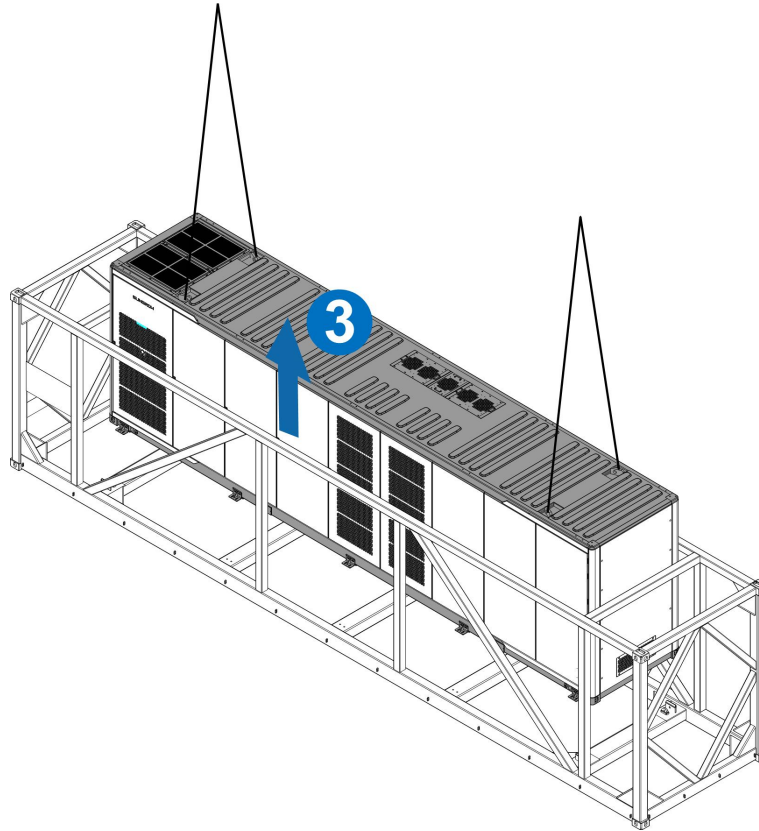
step 1 Remove the corner fittings connecting the top of the BESS and the transport frame.



step 2 Remove the corner fittings connecting the bottom of the BESS and the transport frame. There is no need to remove the corner fittings from the BESS to prevent them from being lost during transportation.



step 3 Lift the BESS out of the transport frame.



-- End

3.6 Storage Requirements

- To prevent possible condensation or its bottom from being soaked by rain water in the rainy season. The BESS should be stored on higher ground.
- Raise the container base if the BESS must be stored outdoors due to site conditions. The specific height should be reasonably determined based on site geological and meteorological conditions. The surface evenness shall not be greater than 5 mm.
- Store the BESS on a dry, flat, and stable ground with sufficient carrying capacity and without any vegetation cover. The ground must be flat and dry.
- Before storage, ensure that the doors of the container and all internal equipment are locked.
- Storage environment temperature: $-30\text{ }^{\circ}\text{C} \sim 60\text{ }^{\circ}\text{C}$, recommended storage temperature: $-30\text{ }^{\circ}\text{C} \sim 25\text{ }^{\circ}\text{C}$.

The battery attenuation coefficients at other temperatures are listed below.

Temperature range	Attenuation coefficient
26 °C ~ 40 °C	0.1 %/month
41 °C ~ 50 °C	0.3 %/month
51 °C ~ 60 °C	0.6 %/month

- Long-term storage of batteries is not recommended because it may cause the decrease in battery capacity. Even if the battery is stored at the recommended storage temperature, irreversible capacity fade will still occur during periods of rest. The longer it has been stored, the greater the capacity fade. Please refer to the technical protocol for specific rate of capacity fade.
- The relative humidity should be between 0~95%, without condensation.
- The air inlet and outlet of the BESS should be effectively protected to prevent rain water, sand and dust from penetrating into the container.
- Carry out periodic inspections. Check the container and the inner equipment for damage at least every half a month.
- Before installing a container that has been stored for more than six months, open the door to visually check and ensure that there is no condensation. Check the container and the inner equipment for damage. Check the product after it is powered on and starts. If necessary, request professionals for testing before installation.
- PACKs should be stored in a clean and dry place and not be exposed to the blazing sun and rain. No harmful gases, flammable and explosive products, or corrosive chemicals should be placed at the storage site. Protect the batteries from mechanical shock, heavy pressure, strong magnetic field, and direct sunlight.
- Pay attention to possible hazards in the surrounding environment, such as sudden temperature changes or collisions, to prevent any damage to the PACK.
- Regularly inspect the device. Ensure that the packaging is not damaged in any way and prevent any damage that may be caused by pests and animals. Replace the packaging immediately if it is damaged.
- The packing box cannot be tilted or turned upside down.

Starting from the date of delivery of SUNGROW, the BESS with a storage period of more than 6 months under the above conditions are to be charged and discharged once to bring the system SOC to 30%~40%.

4 Mechanical Installation

WARNING

During the whole process of mechanical installation, the relevant standards and requirements of the project site must be strictly observed.

4.1 Inspection Before Installation

4.1.1 Checking Deliverables

Check whether deliverables are complete against the attached packing list.

4.1.2 Checking Product

- Check whether the container received is the ordered one.
- Check the BESS and the internal equipment for any damage.

If any problems are found or there is any question, please contact the forwarding company or SUNGROW.

WARNING

Only install the BESS when it is complete and intact.

Before installation, ensure that:

- **The BESS is in good condition, without any damage.**
- **All devices in the BESS are intact, without any damage.**

4.2 Installation Environment Requirements

4.2.1 Installation Site Requirements

- The climate environment and geological conditions, such as stress wave emission and underground water level, should be fully considered when selecting the installation site.
- The installation site should be dry and well ventilated.
- There should be no trees around the installation site to prevent branches or leaves blown off by heavy winds from blocking the door or air inlet.
- The installation site should be away from areas where toxic and harmful gases are concentrated, and free from inflammable, explosive and corrosive materials.
- The installation site should be far away from residential areas to avoid noises.

4.2.2 Foundation Requirements

WARNING

The BESS is heavy as a whole. Before constructing the foundation, it is necessary to inspect the installation site in detail (mainly referring to the geological conditions and environmental climatic conditions, etc.). Commence the design and construction of the foundation only after confirming that all requirements are met.

Unreasonably constructed foundation will bring great troubles to the installation of the BESS, affecting the normal opening and closing of the doors and the normal operation. Therefore, the foundation of the BESS must be designed and constructed according to certain standards to meet the requirements of mechanical support, cable routing and later maintenance and overhaul.

At least the following requirements shall be met during foundation construction:

- The soil at the installation site should be compact. It is recommended that the relative density of soil at the installation site be no less than 98%. Take relevant measures to ensure a stable foundation in case of loose soil.
- Compact and fill the foundation pit to provide sufficient and effective support for the container.
- The container foundations are made according to the foundation plans provided by SUNGROW or confirmed by us, with a tolerance of $\pm 5\text{mm}$ on the top surface of the foundation.
- Raise the foundation to prevent the container base and the interior from rain erosion.
- The cross-sectional area and height of the foundation should meet the requirements.
- Construct corresponding drainage in conjunction with local geological conditions.
- Built a cement foundation with sufficient cross-sectional area and height. The foundation height is determined by the construction party according to the site geology.
- Consider cable routing when building the foundation.



- To facilitate subsequent electrical wiring, it is recommended to pre-set a cable trench in the foundation according to the position of cable inlet holes of the BESS, and pre-embed the conduit.
- The dregs excavated during foundation construction should be removed immediately to avoid latter impact on lifting.

- Built a maintenance platform around the foundation to facilitate later maintenance.
- During the foundation construction, reserve enough space for the AC/DC side cable trench according to the position and size of the cable inlet and outlet holes of the BESS, and pre-embed the cable conduit.

- Determine the specifications and quantity of the perforating gun according to the model and quantity of the cables.
- A drainage system is necessary to prevent the bottom or internal equipment of the BESS from being soaked in water during the rainy season or during heavy rainfall.
- Both ends of all embedded pipes should be temporarily sealed to prevent impurities from entering and causing troubles to later wiring.
- After all cables are connected, cable inlet and outlet and connector should be sealed with fireproof mud or other suitable materials to prevent rodent access.



Pre-embed the grounding unit according to the relevant standards of the country/region where the project is located.

4.2.3 Installation Spacing Requirement

To ensure better heat dissipation at the air outlet, reserve enough space around the installation site. The following figure shows the required minimum spacing.

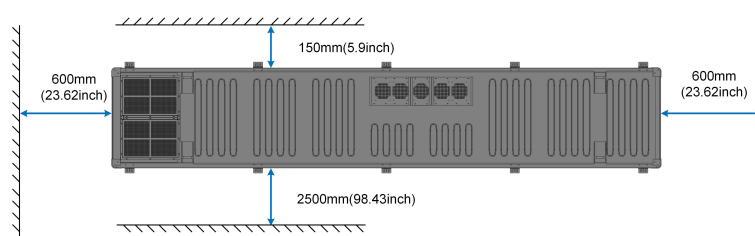


figure 4-1 Installing a single device

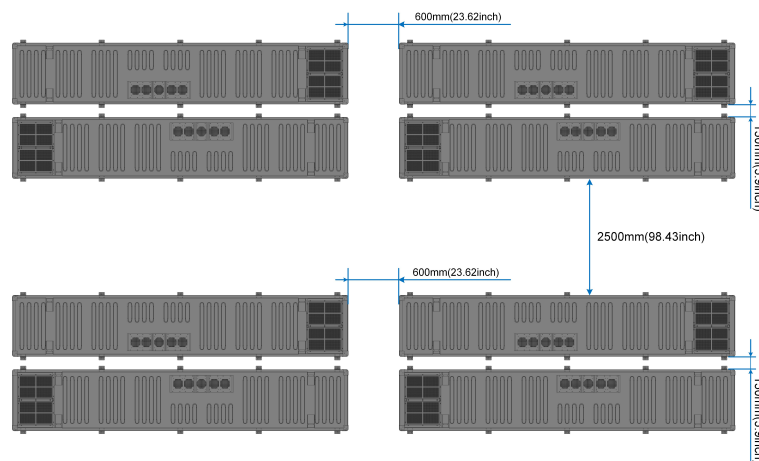


figure 4-2 Installing multiple devices

4.3 Lifting and Fixing

4.3.1 Lifting Precautions

⚠ WARNING

- **In the process of lifting, it is necessary to operate in strict accordance with the safety operation rules of the crane.**
- **No one is allowed to stay within 5m to 10m of the operating area. In particular, it is strictly prohibited to stand under the lifting arm and the lifted machine to avoid casualties.**
- **In case of bad weather, such as heavy rain, fog, gust, etc., the lifting work should be stopped.**

When lifting the BESS, ensure that at least the following requirements are met:

- Lift from the top lifting holes, and ensure on-site safety during lifting.
- Professional personnel should direct the whole lifting process on site.
- Select appropriate lifting machine according to the site conditions. It is recommended that the bearing capacity of the selected lifting machine shall $\geq 200,000\text{kg}$.
- The strength of the sling used should be able to bear the weight of the BESS.
- Ensure safe and reliable connections of all slings and an equal length of slings connected to corner fittings.
- The sling length can be adjusted according to the actual situation on site.
- Ensure that the BESS is steady and not tilting during lifting.
- Take all necessary auxiliary measures to ensure safe and smooth lifting of the BESS.

How the BESS is hoisted by a crane is shown in the figure below. The inner dashed circle indicates the crane operation range. When the crane is working, it is strictly forbidden to stand in the solid circle!

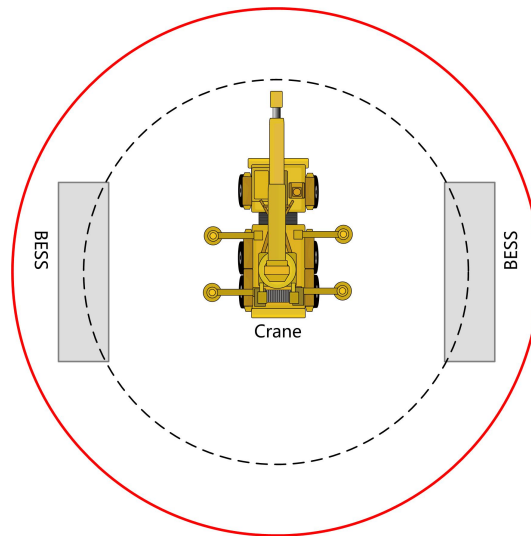


figure 4-3 Schematic diagram of crane operation of one crane

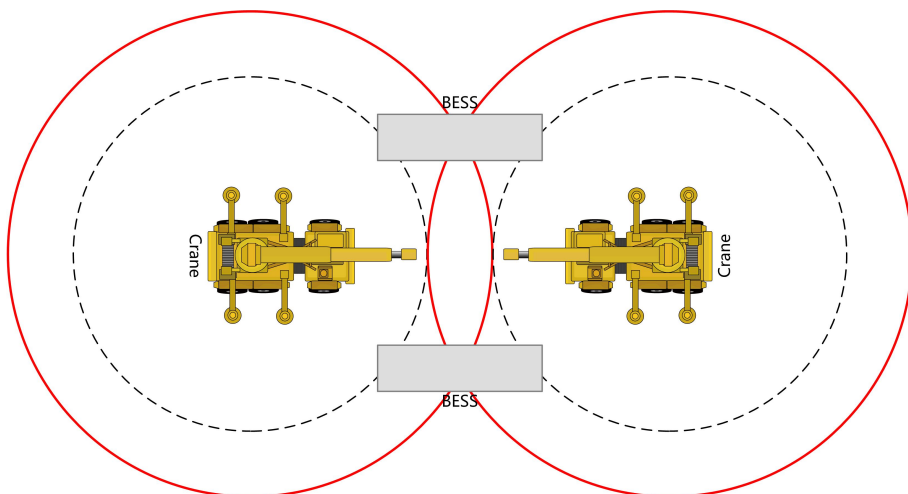


figure 4-4 Schematic diagram of crane operation of two cranes

4.3.2 Lifting

Lift the BESS according to the following requirements:

- The BESS should be lifted vertically. Never drag the container on the ground or on the top of the lower container, and never pull and push it on any surface.
- Lift the BESS slowly. And during lifting, theoretically, it is required to ensure that the center of the hanger and the center of the BESS top is exactly right. In practice, try to minimize the deviation of the two centers, and ensure that the hanger and the BESS top is parallel through visual inspection to ensure the stability of the lifting. The crane should move at a very slow speed at the moment of lifting and lift at a constant speed later.
- When the BESS is in place, place it lightly and smoothly. It is strictly forbidden to throw it to places outside the vertical landing place.

- The BESS should be placed on a solid and flat site with good drainage and no obstacles or protrusions.

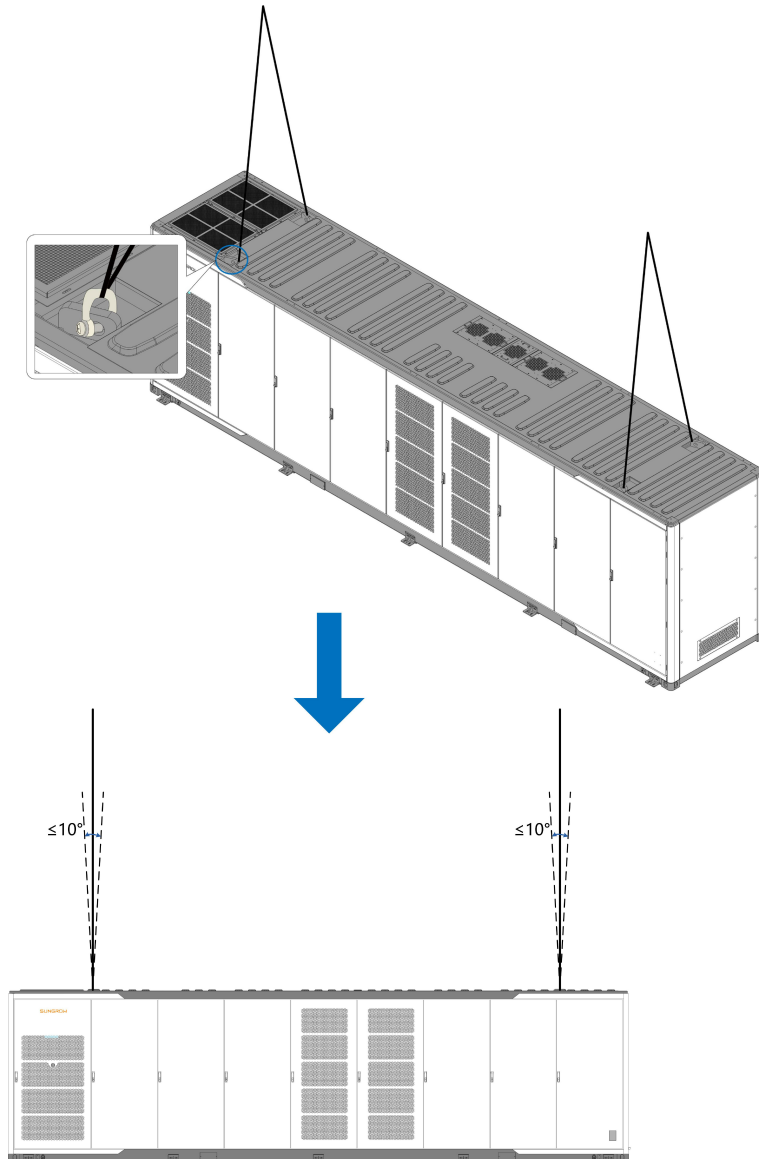


figure 4-5 Lifted by two cranes

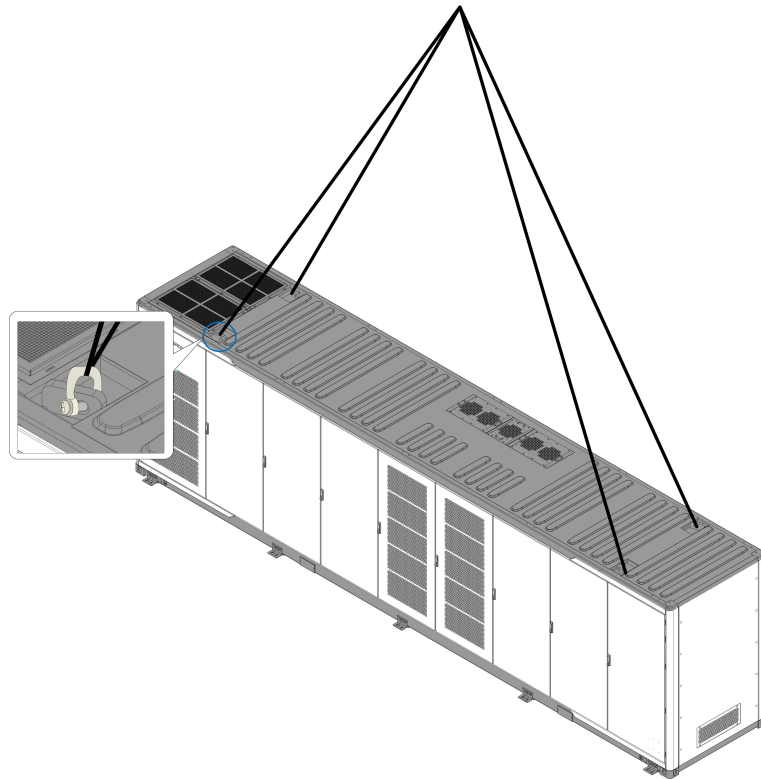


figure 4-6 Lifted by a single crane

Sling and shackle requirements	Specifications
Sling	Use 6×37+1 steel wire rope, wire rope diameter ≥ 37mm
Shackle	WLL 25t and above

⚠ WARNING

- It is strictly prohibited to lift the BESS through the bottom.
- The lifting work shall be in accordance with the relevant standards and specifications of the country/region where the project is located.
- SUNGROW shall not be held liable for any personal injury or property damage caused by violating relevant requirements or other safety precautions.

4.3.3 Fixed Installation

The BESS shall be fixed after being transported to the installation position.

- If two BESS are placed back to back, and the distance between them is within 150 mm~170 mm, fix them as described below:

- Fix the front and rear bottom of the BESS with the foundation. According to actual needs, the bottom can be fixed by welding or L-shaped angle steel.
- Use the connectors in delivery to fix the back top of the two BESS.
- If two BESS are not placed back to back, or the distance between them is greater than 600mm, fix the front and rear bottoms of the BESS to the foundation with the L-shaped angle steel in the delivery.

Top Fixation (Distance between the two BESS is $150\text{mm}\pm 20$)

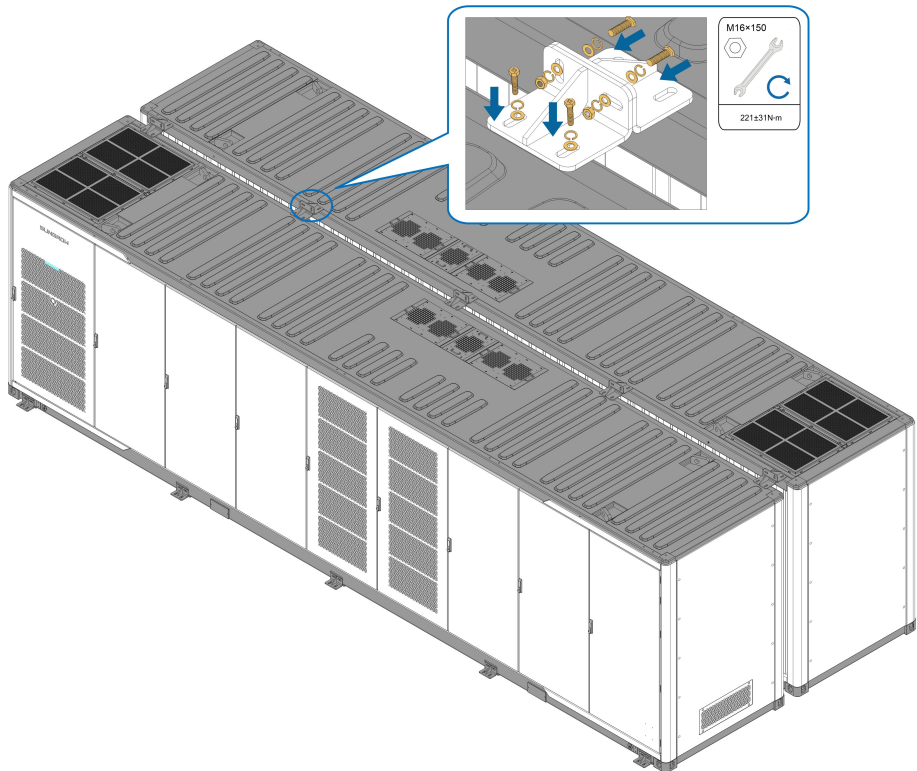


figure 4-7 Back-to-back fixed installation

Bottom Fixation

- Welding fixation method

Weld and fix the bottom of the cabinet with the foundation. After completion, anti-corrosion treatment shall be taken for the welding position.

- Fixed by L-shaped angle steels

Positions need to be fixed with L-shaped angle steels at the bottom of the BESS are circled in the figure below.

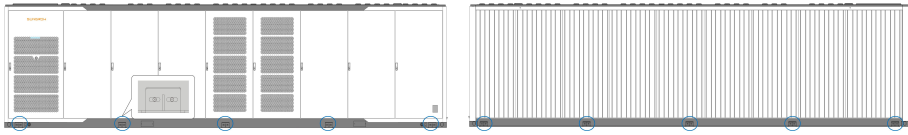


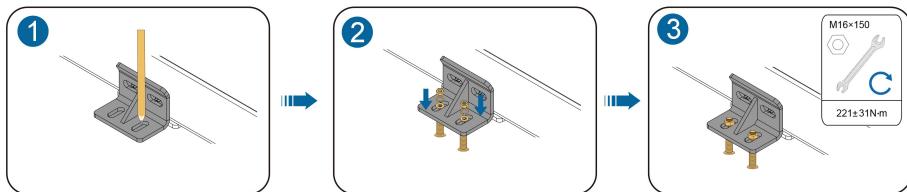
figure 4-8 Positions of L-shaped angle steels

Preparing Installation Tools

Tools that may be used when installing L-angle steel are as follows:

No.	Name	Source
1	Marker pen	User provided
2	Hammer drill	User provided
3	M16 expansion bolt	User provided
4	M16 screw	Not included in the scope of supply
5	Angle steel	Not included in the scope of supply

Installation Method



4.3.4 Film Removal

After fixing the BESS, remove the 3M film on the DCDC cabinet door, the cabinet door of the liquid cooling unit, the mesh of the top fans, the top mesh of the liquid cooling unit, the bottom mesh of the liquid cooling unit, and the mesh at the right side fire suppression air inlet.

Remove the 3M sticker with the yellow label "Key" to obtain the key to open the BESS cabinet door.

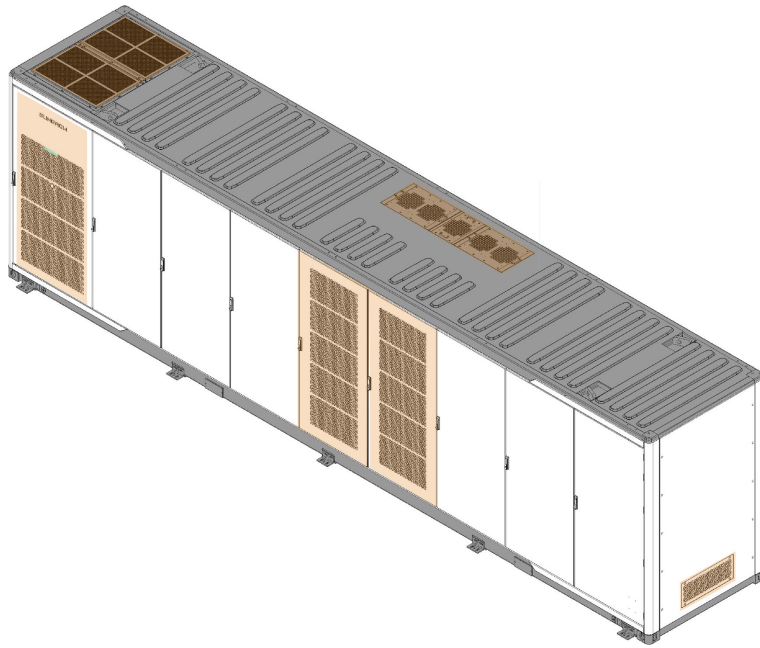


figure 4-9 Diagram of film placement

5 Electrical Connection

5.1 Precautions

⚠ DANGER

High voltage! Electric shock!

- It is strictly forbidden to directly touch the live parts in the unprotected state!
- Before installation, ensure that the all switches are off.

⚠ WARNING

Sand and moisture penetration may damage the electrical equipment in the BESS, or affect their operating performance!

- Avoid electrical connections during sandstorms or when the relative humidity in the surrounding environment is greater than 95%.
- Perform electrical connection when there is no sandstorm and the weather is fair and dry.

⚠ WARNING

- Before wiring, check and ensure that the polarity of all input cables is correct.
- During electrical installation, do not forcibly pull any wires or cables, as this may compromise the insulation performance.
- Ensure that all cables and wires have sufficient space for any bends.
- Adopt the necessary auxiliary measures to reduce the stress applied to cables and wires.
- After completing each connection, carefully check and ensure that the connection is correct and secure.

5.2 Overview of Wiring Area

The wiring diagram of the integrated BESS is shown below:

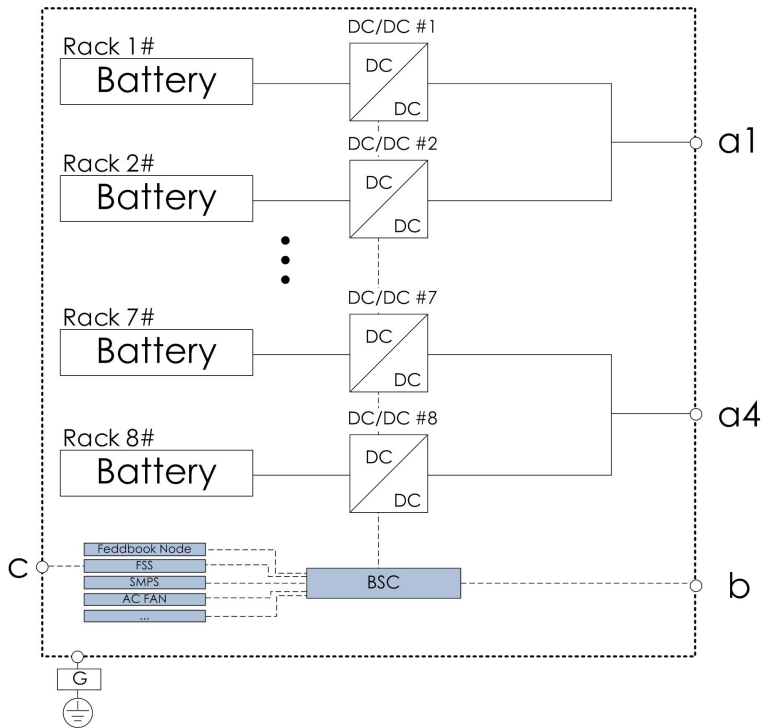


figure 5-1 Wiring diagram

*The diagram only describe the on-site wiring, and the internal wiring is for reference only.

table 5-1 Interface description

No.	Description	Recommended cable specifications
a1~a4	DC output port	500 kcmil
b	Communication port	Armored wire is recommended
c	FSS connection port	For specific wiring, please refer to the specific fire drawings of the corresponding project
G	Grounding point	-

WARNING

- All electrical connection must be carried out strictly in accordance with the wiring diagram.
- All electrical connections must be carried out when the equipment is completely uncharged.

⚠ WARNING



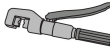

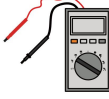






Only qualified electricians can perform the electrical connection. Please comply with the requirements in “Safety Precautions” in this manual. SUNGROW shall not be held liable for any personal injury or property damage caused by ignoring these safety precautions.

NOTICE

- The installation scheme of the BESS must be in full accordance with the regulations or standards where the project is located.
- Failure to follow the installation requirements in this manual may result in faulty device or system, and the damage caused is not covered by the warranty.

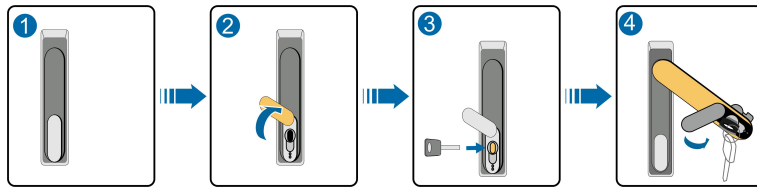
5.3 Preparation Before Wiring

5.3.1 Preparing Installation Tools

Classification	Name and Graphics		
Installation Tools			
	Torque screwdriver	Wire stripper	Terminal crimping tool
			
	Heat gun	Multimeter	Screwdriver
			
	Torque wrench		
Protective tools			
	Protective gloves	Goggles	Safety shoes
			
	Protective clothing		

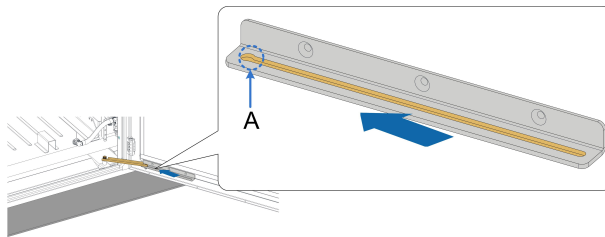
5.3.2 Opening the Container Door and Cabinet Door

step 1 Open the container door with the randomly equipped key.

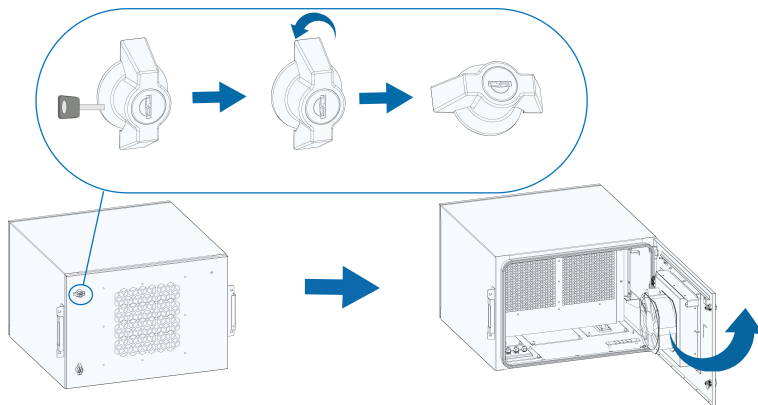


step 2 Fix the container door.

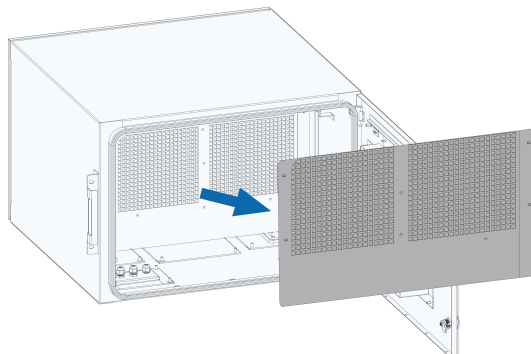
The double-end stud slides when the container door or cabinet door is opened. And when it slides into hole A, the limit rod is fixed.



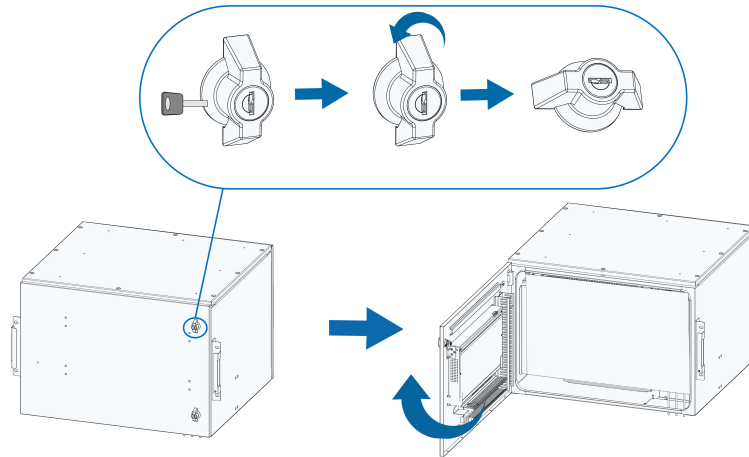
step 3 Open the door of the BCP.



step 4 Remove the protective cover of the wiring area in the BCP.



step 5 Open the door of the BSP.



-- End

*The figure is for reference only and the actual product shall prevail.

5.3.3 Preparing Cables

The cables must meet the following requirements:

- The current carrying capacity of the cable meets requirements. Factors affecting the current carrying capacity of a conductor include but are not limited to:
 - Environmental conditions;
 - Type of the insulation material of the conductor;
 - Cabling method;
 - Material and cross-sectional area of the cable.
- Select cables with a proper diameter according to the maximum load, and the cables should be long enough.
- All DC input cables must be of the same specifications and materials.
- AC output cables of three phases must be of the same specifications and materials.
- Only flame retardant cables can be used.

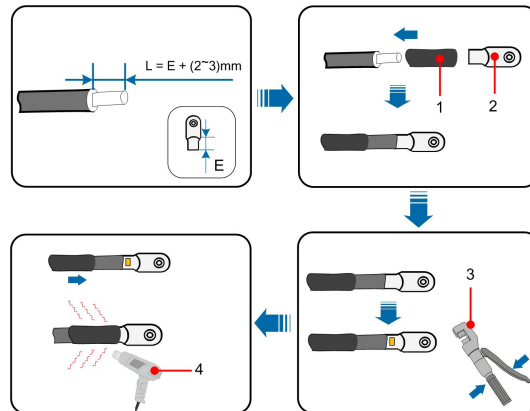
NOTICE

- **The cables used should comply with requirements of local laws and regulations.**
- **The cable color in figures in this manual is for reference only. Please select cables according to local standards.**

Crimp terminal

Crimp OT/DT terminals

Follow the steps shown below to crimp terminal.



No.	Description	No.	Description
1	Heat shrink tubing	2	OT/DT terminal
3	Hydraulic pliers	4	Heat gun

5.4 Ground Connection

NOTICE

Ground the product strictly following local standards and regulations.



Both grounding points must be grounded to ensure a reliable grounding.

Overview

There are two grounding methods: fixing by welding with grounding flat steel and fixing with grounding cable. For the location of the grounding point, please refer to "**Container Appearance**".

Grounding Flat Steel

Remove the protective tape from the grounding point and weld 60mmx100mm hot-dip galvanized flat steel to the grounding point. Spray the entire fixed surface after ground connection.

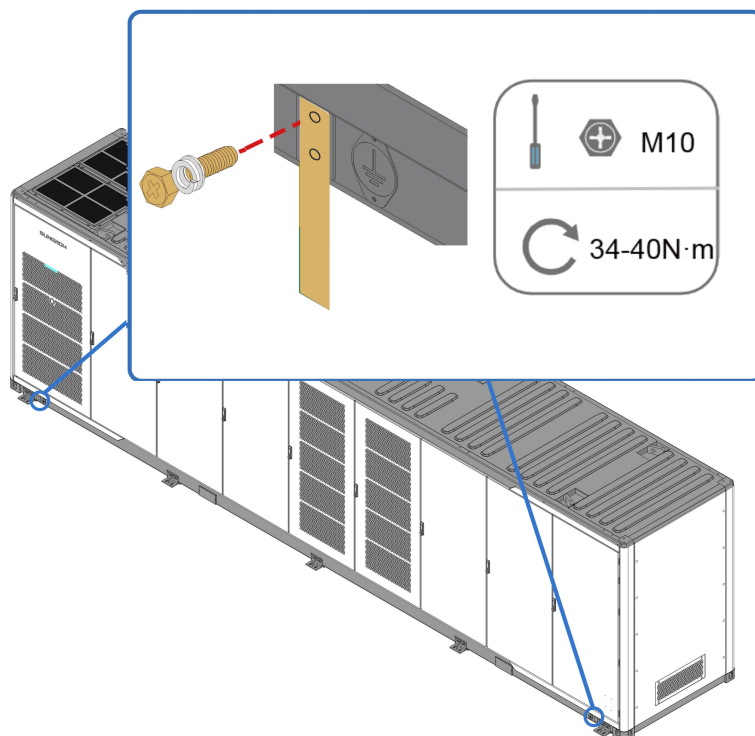


figure 5-2 Diagram of the grounding flat steel

*The figure is for reference only and the actual product shall prevail.

Grounding Cable

Use a grounding cables of $70\text{mm}^2 \sim 95\text{mm}^2$ to ensure a reliable connection between the two grounding points and the grounding points of the BESS. (The grounding point is covered with protective tape before delivery. Remove the tape before wiring.)

Crimp DT terminals, refer to "5.3.3 Preparing Cables" for detailed steps. Use grounding cables to ensure a reliable connection between the two grounding points and the grounding points of the ESS. When finished, tighten them with M10 bolts.

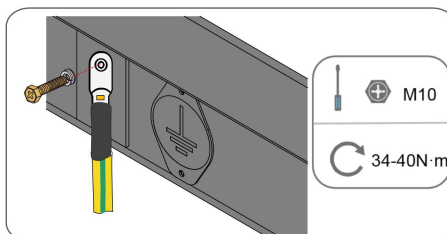


figure 5-3 Diagram of the grounding cable

*The figure is for reference only and the actual product shall prevail.

Please perform the external grounding connection according to the actual on-site condition and the instructions of the plant personnel.

The grounding resistance shall be measured after the ground connection is finished, and the resistance value shall be no more than 4Ω .

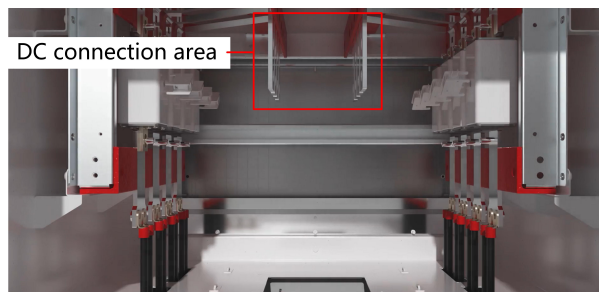


The specific grounding resistance shall comply with relevant national/local standards and regulations.

5.5 DC Output Port Connection

Overview

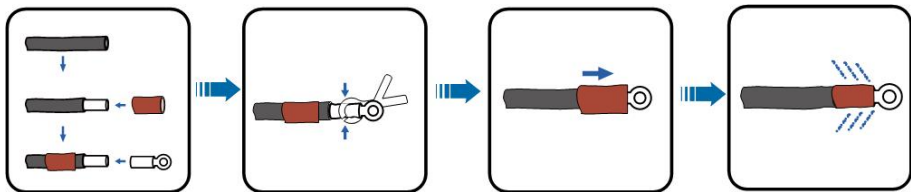
The DC output port inside the BCP is shown in the following figure.



* The image shown here is for reference only. The actual product received may differ.

Procedure

- step 1 Lead the cable into the BCP wiring area through the inlet hole, and mark the cable polarity.
- step 2 Strip the protective layer of the cable to expose the copper core of the wire with strippers.
- step 3 Install the OT terminals to the wire and crimp them with a crimping tool. Install a heat-shrink tube to the terminal and heat it with a heat gun.



- step 4 Secure the OT terminal to the wiring hole by M12 bolt with a tightening torque of $60\sim 70\text{ N}\cdot\text{m}$.

- If copper wires are used, fasten the bolt assembly as shown below.

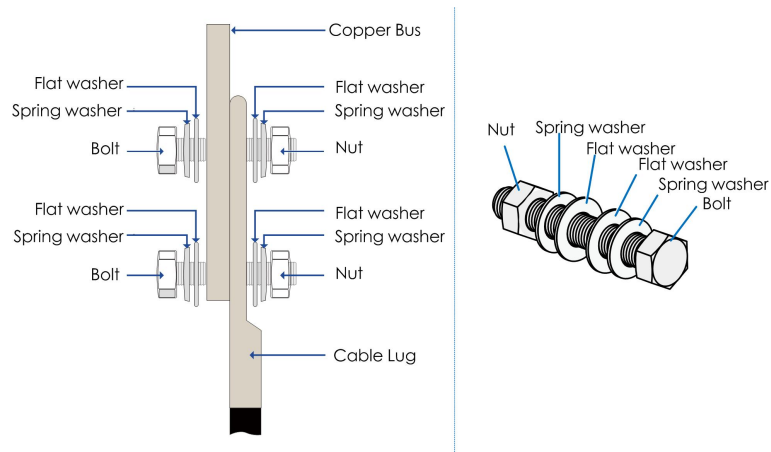


figure 5-4 Copper wire connection

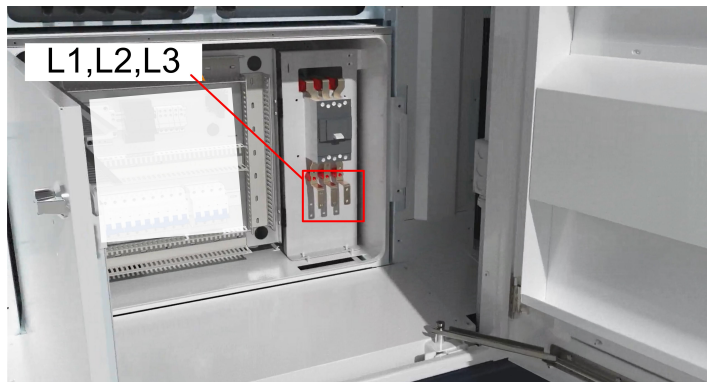
step 5 Pull the cable back slightly after wiring to ensure that the cable is long enough.

-- End

5.6 Auxiliary Power Supply Port Connection

Overview

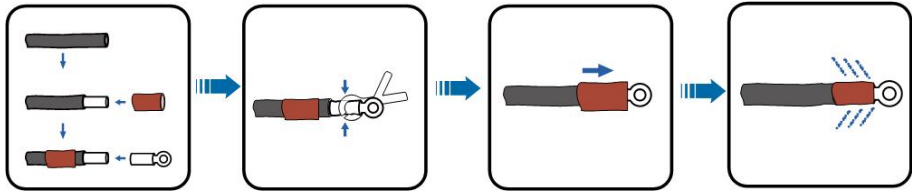
The auxiliary power supply port inside the BSP is shown in the following figure.



* The image shown here is for reference only. The actual product received may differ.

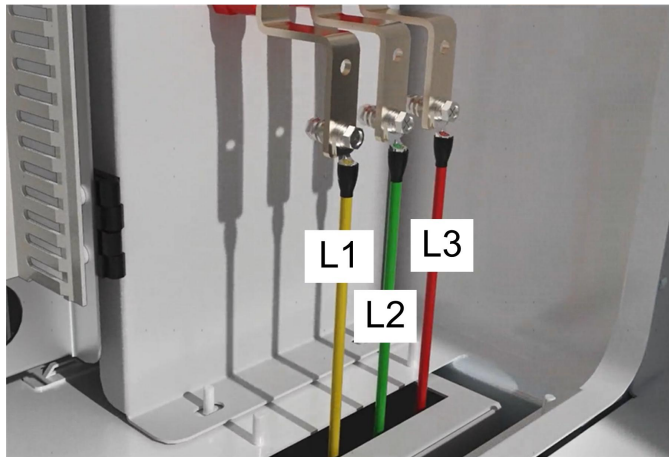
Procedure

- step 1 Lead the cable into the BSP wiring area through the inlet hole, and mark the cable phase.
- step 2 Strip the protective layer of the cable to expose the copper core of the wire with strippers.
- step 3 Install the OT terminals to the wire and crimp them with a crimping tool. Install a heat-shrink tube to the terminal and heat it with a heat gun.



step 4 Secure the OT terminal to the wiring hole by M5 bolt with a tightening torque of 4~4.8 N·m. (For detailed wiring procedure, please refer to “figure 5-4 Copper wire connection”.

step 5 Pull the cable back slightly after wiring to ensure that the cable is long enough.



* The image shown here is for reference only. The actual product received may differ.

NOTICE

- **Strictly follow the phase sequence to connect cables.**

-- End

5.7 Ethernet Communication Port Connection

Overview

The Ethernet communication port inside the BSP is shown in the figure below.

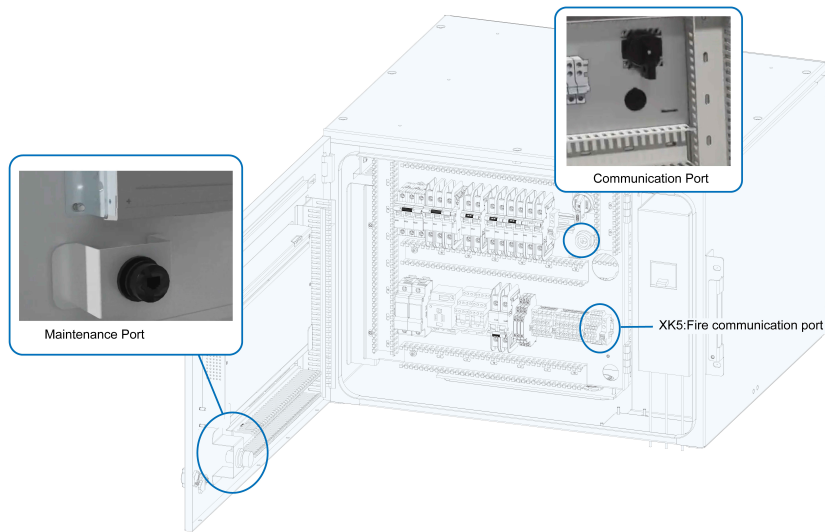


figure 5-5 Network port location diagram

* The image shown here is for reference only. The actual product received may differ.

Procedure

step 1 Lead the CAT-5e cable into the BSP wiring area through the inlet hole.

step 2 Connect the Ethernet port to the external device.

-- End

5.8 Post-wiring Operations

Check the wiring thoroughly and carefully when all electrical connections have been completed. In addition, perform the following operations:

- Check all air inlets and outlets for blockage.
- Seal the gap around the cable inlet holes.
- Put all protective covers back in place firmly.

WARNING

- **Rodents may enter if the product is not properly sealed.**

Locking Cabinet Doors and Container Door

step 1 Reinstall the protection cover of the wiring area in the reverse order of removal.

step 2 Close the doors of the BSP and the BCP, lock the doors, remove the keys and store them securely.

step 3 Lock the container door, pull out the key, and store it securely.

-- End

6 Battery connection

6.1 Precautions

Always follow the safety instructions in this manual. In order to avoid personal injury and property damage that may occur during installation or operation, and extend the service life of this product, please carefully read all safety instructions.

Improper or incorrect use may result in:

- A threat to the life and personal safety of the operator or third parties;
- Damage to the energy storage system or other property of the operator or third party.



- The safety precautions in this manual do not cover all specifications to be followed, and all operations should be performed based on the site conditions.
- SUNGROW shall not be liable for any loss arising from failure to follow the safety precautions in the manual.

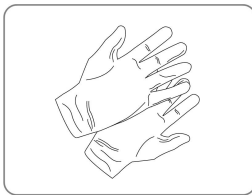
WARNING

- **While installing the device with hazardous voltage, follow relevant regulations and local installation safety guidelines.**
 - **Please observe the regulations on the correct use of tools and personal protective equipment.**
 - **All connections must be carried out with distinctive guidance. Any guess and ambiguous attempts must be prohibited.**
 - **Tools with an insulating protective coating must be used.**
- Connecting cables should meet the voltage and current requirements.
 - All connectors must be safe and reliable to avoid loosening or virtual contact. They must be corrosion-resistant, wear-resistant and shock-proof.
 - All connections must comply with the requirements of relevant national standards to prevent arc discharge in any form.
 - The connections of internal batteries must be equipped with anti-vibration and antiloosening devices. Temperature, voltage and current sensors must be connected safely and reliably, to prevent loosening, ageing and extrusion. All sensor cables must be free of metal exposure.
 - Any type of short circuit should be prevented in the connection process.
 - Operators must use this product with personal protective equipment.

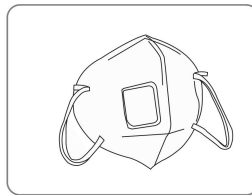
- All connections must be carried out with distinctive guidance. Any guess and ambiguous attempts must be prohibited.
- Key connections must be correct, reliable (without loosening) and in good contact, without short-circuits.
- All the finished connections must be measured and confirmed one by one.
- All connections must not be in contact with the casing or other components or shortcircuited.
- If there are other uncertain factors, please consult the after-sales technicians of SUNGROW before any operation.

6.2 Cable Connection

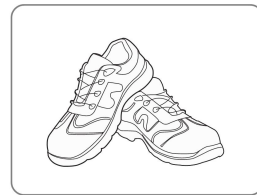
Tool preparation



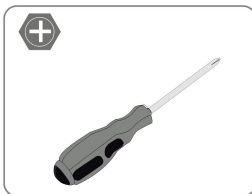
Safety gloves



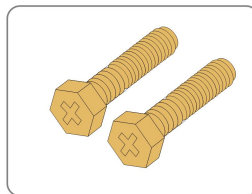
Dust mask



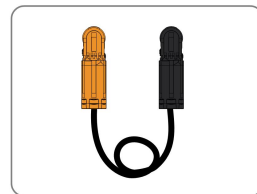
Safety shoes



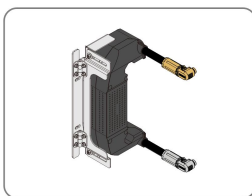
Phillips screwdriver



Cross recessed bolt (M6)

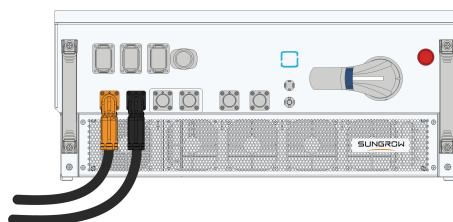


Cable

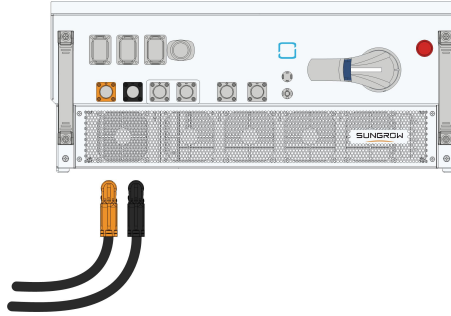


Fuse

step 1 Wear insulating shoes and high-voltage gloves before connecting power cables. At this time, the power lines between the packs of the battery system are all disconnected, and only the power lines between the pack and the DCDC are connected.



- step 2 Before connecting the power line between the PACKs, disconnect the power line between the Pack and the DCDC, as shown in the figure below.



- step 3 Install the fuse. Open the container door, there are four sets of mounting holes reserved on the leftmost and rightmost door frames of the battery box, and use M6 hexagonal Phillips screws to fix the fuses on the mounting holes.

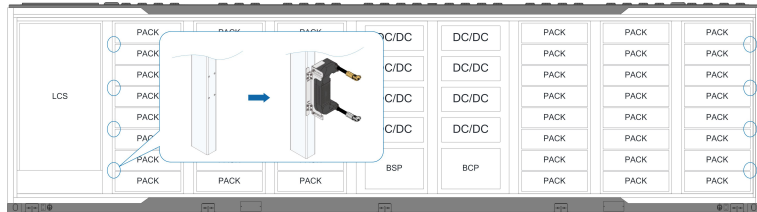


figure 6-1 Installation position of fuse

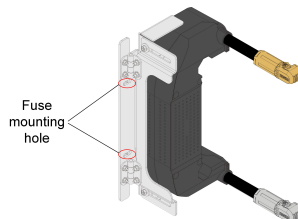


figure 6-2 Fuse mounting hole

NOTICE

The screws are not tightened after installation.

- step 4 Loosen the bracket fixing bolts.

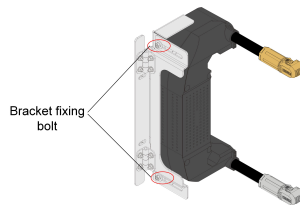
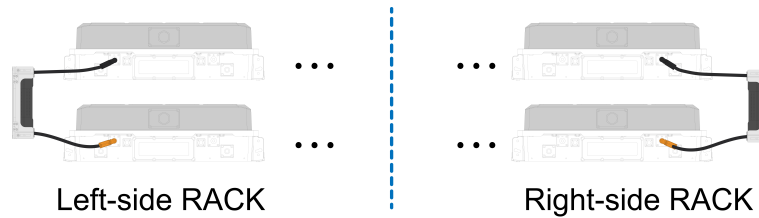


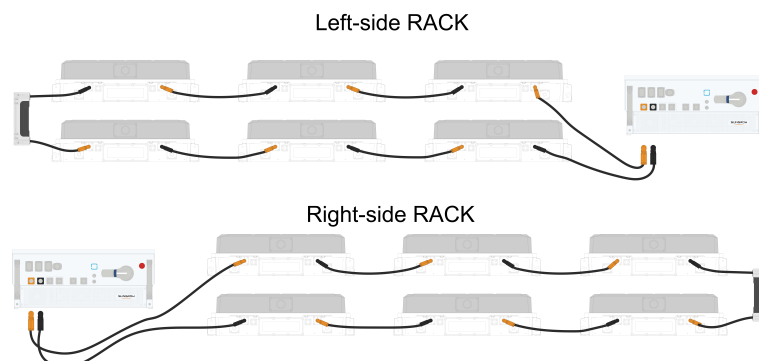
figure 6-3 Bracket fixing bolts

step 5 Correctly insert the aviation plug that comes with the fuse into the battery base.



- The positive pole of the aviation plug needs to be inserted into the positive base, and the negative pole needs to be inserted into the negative pole base. The positive pole is orange, and the negative pole is black. When the aviation plug is plugged tightly, it will make a "click" sound.
- When the power line is connected, the position of the fuse can be adjusted appropriately.

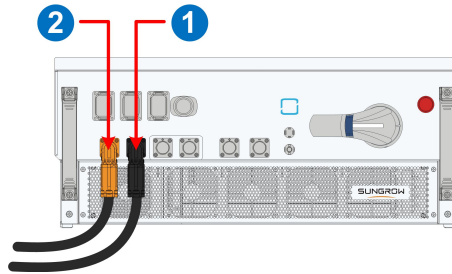
step 6 Connect the power cable between the packs. Connect the power line between two adjacent PACKs vertically or between two adjacent PACKs horizontally, and you will hear a clicking sound after the air plug is plugged in tightly. (Note: the positive pole of the aerial plug is inserted into the base against the positive pole, and the negative pole is inserted against the negative pole. The positive pole is the orange plug, and the negative pole is the black plug)



step 7 Connect the power connection line between the Pack and the DCDC :

- 1 Connect the power cable between the Pack and the negative terminal of the DCDC terminal.

- 2 Connect the power cable between the Pack and the positive terminal of the DCDC terminal.



-- End

7 Power-on and Power-off Operation

7.1 Power-on Operation

WARNING

- The BESS can only be put into operation after confirmation by a professional and approved by the local power department.

WARNING

- For BESS with a long shutdown time, check the equipment thoroughly and carefully to ensure all indexes are acceptable before powering it on.

7.1.1 Inspection Before Powering up

Before powering on the equipment, check the following items carefully.

- Check whether the wiring is correct.
- Check whether the protective covers inside the equipment are installed firmly.
- Check whether the emergency stop button is released.
- Check and ensure that there is no grounding fault.
- Check whether the AC and DC voltages meet startup conditions and ensure that there is no over-voltage with a multimeter .
- Check and ensure that no tools or components are left inside the equipment.
- Check the status of the power supply switch QF of the liquid cooling system, and ensure that all switches are closed.

7.1.2 Powering on Steps

step 1 Power on the BESS.

step 2 Close the load switch SWITCH 1 on the panels of SD175HV 1#~8#.

step 3 Close the load switch SWITCH 2 on the panels of:

- ST2752UX: SD175HV 4# and SD175HV 5#
- ST2695UX: SD175HV 3# and SD175HV 4#
- ST2637UX: SD175HV 3# and SD175HV 4#
- ST2580UX: SD175HV 3# and SD175HV 4#
- ST2523UX: SD175HV 2# and SD175HV 3#
- ST2465UX: SD175HV 3# and SD175HV 4#

- ST2408UX: SD175HV 3# and SD175HV 4#
- ST2351UX: SD175HV 3# and SD175HV 4#
- ST2293UX: SD175HV 3# and SD175HV 4#

step 4 Power on the BCP.

- 1 Close the miniature circuit breaker Q1 (TEMP CONTROL).
- 2 Finish powering on the BCP.

step 5 Power on the BSP.

- 1 Close the upstream power switch of the BSP.
- 2 Close the DC load switch QS1 in the BSP.
- 3 Close the main control switch of the 480Vac power QF1 (AC MAIN SWITCH).
- 4 Close the fire suppression 230Vac power supply switch Q7 (FSS).
- 5 Close the power switch of the LCS Q1(LCS).
- 6 Close the branch circuit breaker of the transformer Q2 (TRANSFORMER).
- 7 Close the power supply switch of the maintenance socket Q3(MAINTAIN SOCKET) and the switch of the switching power Q4(DC 24V).
- 8 Close the fan power switch Q5 (AC BRANCH SWITCH1#) and switch Q6(AC BRANCH SWITCH2#) inside the cabinet.
- 9 Finish powering on the BSP.

NOTICE

- **Check the status of circuit breakers in the liquid cooling unit. If any circuit breaker is not closed, close it.**
- **If the battery container is equipped with a fire engine and a combustible gas engine, check the state of the ship type switch in the engine. If any ship type switch is in the off position, move it to the off position.**

step 6 Start the PCS.

-- End

WARNING

If one circuit breaker trips during power-on process, suspend closing other circuit breakers and immediately check whether a short circuit occurs to downstream loads of the tripped circuit breaker;

7.2 Power-off Operation

7.2.1 Planned Powering off

step 1 Shut down the PCS.

step 2 Shut down the BESS.

- 1 When SD175HV 1#~8# shut down, disconnect the load switch SWITCH 1 on the panels of each SD175HV.
- 2 Switch the load switch SWITCH 2 on the panels of:
 - ST2752UX: SD175HV 4# and SD175HV 5#
 - ST2695UX: SD175HV 3# and SD175HV 4#
 - ST2637UX: SD175HV 3# and SD175HV 4#
 - ST2580UX: SD175HV 3# and SD175HV 4#
 - ST2523UX: SD175HV 2# and SD175HV 3#
 - ST2465UX: SD175HV 3# and SD175HV 4#
 - ST2408UX: SD175HV 3# and SD175HV 4#
 - ST2351UX: SD175HV 3# and SD175HV 4#
 - ST2293UX: SD175HV 3# and SD175HV 4#

step 3 Disconnect the BCP.

- 1 Disconnect the miniature circuit breaker Q1 (TEMP CONTROL).
- 2 Finish powering off the BCP.

step 4 Disconnect the BSP.

- 1 Disconnect the DC load switch QS1 inside the BSP.
- 2 Disconnect the power switch of the maintenance socket Q3 (MAINTAIN SOCKET), the AC power supply switch Q4 (DC 24V), the fan power supply switch Q5 (AC BRANCH SWITCH1#), and the switch Q6 (AC BRANCH SWITCH2#) inside the cabinet.
- 3 Disconnect the power supply switch of the LCS Q1 (LCS) and the branch switch of the transformer Q2 (TRANSFORMER) inside the cabinet.
- 4 Disconnect the main control switch of the 480Vac power QF1 (AC MAIN SWITCH).
- 5 Disconnect the fire suppression 230Vac power supply switch Q7 (FSS).
- 6 Disconnect the upstream power switch of the BSP.
- 7 Finish powering off the BSP.

-- End

7.2.2 Unplanned (Emergency) Shutdown

- Fire incident:
Contact local fire department professionals.

- Unplanned outage (shutdown due to faults):

Contact SUNGROW.

8 Fire Suppression

WARNING

An automatic fire suppression system is equipped inside the BESS. Do not flip the fire suppression switch unless an emergency occurs.

8.1 General Rules

WARNING

Please comply with the fire laws and regulations of the country/region where the project is located.

Check and maintain the fire equipment regularly to ensure a normal operation of all functions.

WARNING

All fire-related components (combustible gas sensor, smoke sensor, temperature sensor, input and output modules, aerosol (if any)) in the BESS products sold by SUNGROW in the UL area meet UL standards. For other certification or to meet other fire protection requirements in the project location, please contact SUNGROW individually.

WARNING

If thermal runaway or a fire occurs inside the BESS, do not open the door of the PowerTitan. The cabinet door can only be opened by professionals after the professionals or firefighters confirm that the fire and potential hazards are eliminated on site.

8.2 Fire Suppression Equipment

The BESS has a water fire suppression system that can effectively extinguish the fire. It is equipped with combustible gas detectors, smoke detectors, and temperature detectors. If any abnormality is detected, the system sends a signal to the station-level alarm host through the BSP external terminal for early warning of fire.

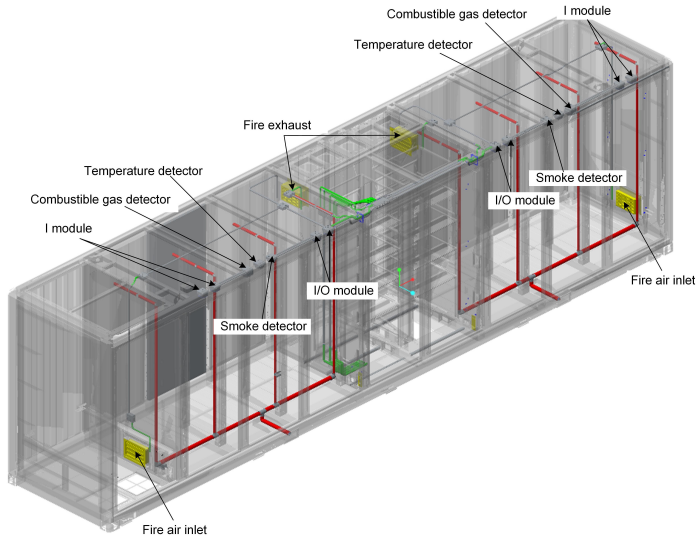


figure 8-1 Diagram of fire fighting system composition

8.3 Exhaust System

When the concentration of combustible gas is detected to reach 10% LEL, the combustible gas detector in the BESS sends a signal to the station-level alarm host for fire warning through the BSP external terminal, while the signal is transmitted to the EMS to shut down the BESS and turn on the exhaust system (start the air intake equipment and exhaust equipment).

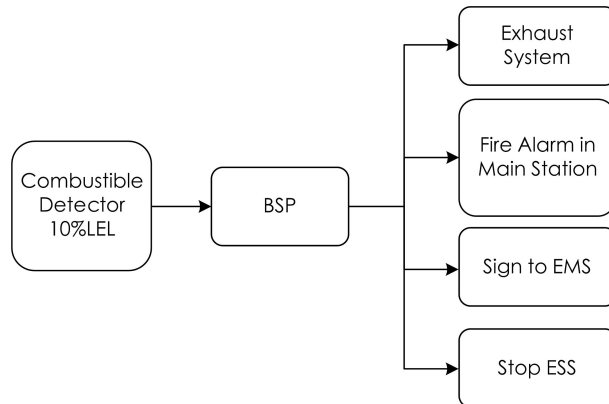


figure 8-2 Control logic of water fire suppression system

8.4 Water Fire Suppression System

BESS is equipped with sprinkler prefabricated pipe, with which the water system can start automatically or be started manually. If an automatic sprinkler water fire suppression system

is required, subsequent construction is necessary. Water supply pipes and equipment outside the BESS need to be connected to the BESS sprinkler connections, please decide according to the actual project.

The sprinkler system adopts upright nozzles to ensure that the water can be sprayed to all areas in the cabinet.

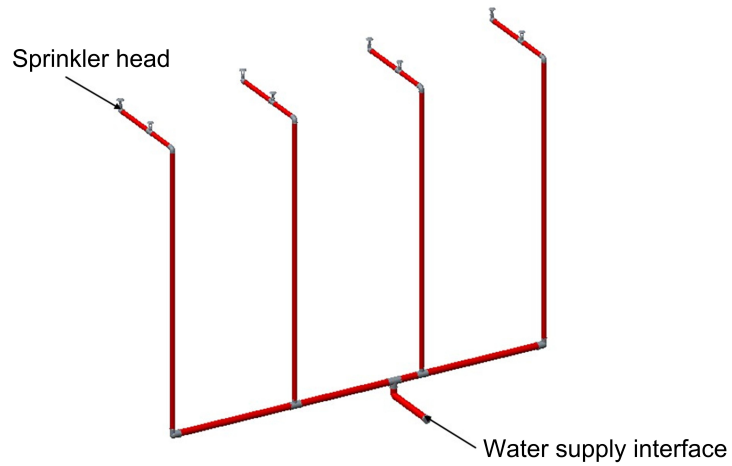


figure 8-3 Piping of water fire suppression

9 Troubleshooting

When the BESS changes abnormally, it is recommended to conduct preliminary investigation through the faults and troubleshooting methods described in the following LC200 manual.

Link	QR code
LC200 User Manual	

If you still cannot solve the problem or still have questions with the help of the manual, please contact SUNGROW. It is recommended to provide the following information synchronously after powering on again:

- Models and serial numbers of the BESS and internal equipment
- Fault information and brief description
- If possible, provide photos of the fault site

10 SOC Calibration Instructions

10.1 Calibration Before Initial Commissioning or After Long-term Storage

The battery system shall be tested according to the nominal power of the product before being put into operation for the first time or after being stored for over 6 months. A standard calibration process includes three phases: fully discharge, time of repose (2.5 h), and fully charge, as described below.

- step 1 Click **Param settings** on the WEB page of LC and set the work mode of the LC to **Local**.
- step 2 Click **Param settings** -> **SOC Parameters** on the WEB page of LC to set the working range of SOC from 0% to 100%.
- step 3 Fully discharge: Fully discharge the battery until the system SOC reaches 0%.
- step 4 Time of repose: Let the system rest for 2.5 h for SOC calibration, and there should be no charge or discharge current during this period. There is no requirements for auxiliary power supply.
- step 5 Fully charge: Fully charge the system until the system SOC reaches 100% after the time of repose ends.

-- End

The capacity calibration process can be adjusted to "fully charge, time of repose (2.5 h), and fully discharge" according to the site conditions. Restore the work mode of the LC and the working range of SOC to default settings after calibration.

10.2 Calibration During System Operation

The battery system SOC shall be tested according to the nominal power of the product if the battery system fails to automatically calibrate the SOC due to being in frequency modulation status or being charged and discharged incompletely in a long time. A standard calibration process includes two phases: fully discharge, and time of repose(2.5 h), as described below.

- step 1 Click **Param settings** on the WEB page of LC and set the work mode of the LC to **Local**.
- step 2 Click **Param settings** -> **SOC Parameters** on the WEB page of LC to set the lower limit of SOC working range to 0%
- step 3 Fully discharge: Fully discharge the battery until the system SOC reaches 0%.
- step 4 Time of repose: Let the system rest for 2.5 h for SOC calibration, and there should be no charge or discharge current during this period. There is no requirements for auxiliary power supply.

-- End

Restore the work mode of the LC and the working range of SOC to default settings after calibration.

11 Routine Maintenance

11.1 Precautions Before Maintenance

⚠ WARNING

Do not open the door to maintain the BESS in rainy, humid or windy days. SUNGROW shall not be held liable for any damage caused by violation of the notice.

⚠ WARNING

To avoid electric shock, do not perform any other maintenance operations beyond those described in this manual. If necessary, contact Sungrow Customer Service for maintenance.

11.2 Item and Period for Container Maintenance

11.2.1 Maintenance (Every two years)

Item	Check method
System status and cleaning	<p>Check the following items, and correct immediately those failing to meet the relevant requirements:</p> <ul style="list-style-type: none">• Check whether there is any damage or deformation of the container and internal devices.• Check if there is abnormal noise during operation of internal devices.• Check whether the temperature in the container is excessively high.• Check whether the humidity and the amount of dust inside the container are within the normal range. Clean the equipment if necessary.• Check whether the air inlet and outlet of the BESS are blocked.
Warning marks	Check whether the warning labels and marks are clearly visible and free of stains and damage. Replace them if necessary.
Ground of the shielded layer of cables	Check whether the cable shielding layer is in good contact with the insulation sleeve and whether the copper bus bar is firmly fixed.

Item	Check method
Surge protection device and fuse	Check whether the SPD and fuse are properly fastened.
Corrosion	Check whether there is oxidation or rust inside the container.

11.2.2 Maintenance (Once a year)

Item	Check method
	Check the following items, and correct immediately those failing to meet relevant requirements: <ul style="list-style-type: none"> • Check whether there are flammable objects on the top of the container. • Check whether the welding points between the container and the foundation steel plate are firm and whether there is corrosion. • Check whether there is any damage, flaking paint or sign of oxidization on the enclosure. • Check whether the lock of the cabinet door can be unlocked flexibly. • Check whether the sealing strip is fixed properly.
Outside the container	
Inside the container	Check whether there are foreign objects, dust, dirt, and condensed water inside the integrated energy storage system.
Air inlet and outlet	Check the temperature of the radiator and the amount of dust accumulated. Clean heat-dissipation modules with a vacuum cleaner if necessary.
	Completely power off the devices inside the BESS before checking. For any non-conformances found during inspection, correct them immediately. <ul style="list-style-type: none"> • Check whether the cable layout is normal and whether there is a short circuit. For any non-conformances found during inspection, correct them immediately. • Check whether all cable entry are well sealed. • Check whether there is water seepage inside the BESS. • Check whether the power cables are loose, and fasten them again by the torque specified previously. • Check whether the power cables and control cables are damaged, especially if the surface contacting the metal surface is cut. • Check whether the insulation tapes on the power cable terminals fall off.
Wiring and cable layout	

Item	Check method
Ground connection and equipotential connection	<ul style="list-style-type: none"> • Check whether the ground connection is correct and the grounding resistance shall be no more than 4Ω. • Check whether the equipotential connection inside the integrated BESS is correct.
Fan	<ul style="list-style-type: none"> • Check the running status of fans. • Check whether fans are blocked. • Check if there is abnormal noise during operation of the fans.
Screw	Check whether internal screws fall off.

11.2.3 Maintenance (Every half a year to once a year)

Item	Check method
Safety function	<ul style="list-style-type: none"> • Check whether the shutdown key on the touchscreen and the emergency stop button work normally. • Simulate shutdown. • Check the warning marks and other device marks, and replace them timely when they are fuzzy or damaged.
Software maintenance	Check the settable parameters on the Web.
Internal components inspection	<ul style="list-style-type: none"> • Check the cleanness of the circuit board and other elements and components. • Check the temperature of the radiator and the amount of dust accumulated. Clean heat-dissipation modules with a vacuum cleaner if necessary. • Replace the air filter screen when necessary. <p>Note! It is necessary to check ventilation of the air inlet. Otherwise, fault may occur due to overheating if the module cannot be cooled effectively.</p>
Device maintenance	<ul style="list-style-type: none"> • Carry out regular inspection for corrosion of all metal components (once per half a year). • Check the contactors (auxiliary switches and micro-switches) annually to ensure the good mechanical operation. • Check the running parameters (especially voltage and insulation).

11.3 Maintenance of Liquid Cooling System

The following provides the recommended maintenance periods. The actual maintenance period shall be adjusted reasonably in consideration of the specific installation environment of the product.

Factors like the power plant scale, the location, and the site environment can affect the maintenance period of the product. It is necessary to shorten the maintenance period and increase the maintenance frequency in the event of heavy sandstorm or dust in the operation environment.

Item	Content	Check method	Maintenance tools
Fan	Check whether the fan blades cannot rotate or are damaged. If so, replace the fan.	1. The fan blade rotates smoothly without abnormal noise; 2. No damage to fan blade. Note: Check this item at least half a year. Blade damage inspection is not mandatory.	Screwdriver with long handle
Water pump	1. Check whether over 5% of the cooling air inlet hole of the water pump is blocked. If so, clear it with a brush; 2. Visually inspect the pump body (not the joint parts) and check whether there is obvious water dripping (except condensate). If so, replace the sealing ring of the pump.	1. The water pump runs smoothly without abnormal noise; 2. There is no obvious dripping on the pump body (except condensate).	Brush
Water system	Check the high and low pressure of the water system through HMI. The high pressure should be 2.8bar and the low pressure should be 0.2 bar. 1. If the high pressure is higher than 2.8bar, check whether the filter of the water system is dirty and blocked; 2. If the low pressure is lower than 0.4 bar, replenish the water in the system.	High pressure < 2.8bar; Low pressure > 0.4 bar	Slotted screwdriver, Phillips screwdriver, water pump, water pipe, clamp.

 **WARNING**

If the BESS has a "communication failure or failure of the liquid-cooled unit", please contact the after-sales service personnel in time to ensure the functional integrity of the system.

11.4 Maintenance of DC/DC

WARNING

Risk of inverter damage or personal injury due to incorrect service!

Before any maintenance operation, the following steps must be followed:

- **Wait at least 5 minutes for inner capacitors to discharge completely before performing internal maintenance or troubleshooting.**
- **Test the product with a tester to make sure that there is no voltage or current.**

CAUTION

A temporary warning sign or barrier must be posted to keep non-related persons away while performing electrical connection and service work.

WARNING

When disassembling and maintaining the DC/DC, first remove the cable fixing parts under the DC/DC to ensure that the cables are squeezed during disassembly and maintenance.

NOTICE

Reboot the converter only after all faults that may affect the safety performance of the converter are cleared.

The converter does not contain any part that require maintenance. Do not change the internal components of the converter unless you are authorized to do so.

Please contact Sungrow Customer Service for maintenance service. Otherwise SUNGROW shall not provide any warranty or be held liable for any losses due to such negligence.

Touching the PCB or other static sensitive components may cause damage to the device.

- **Do not touch the circuit board unnecessarily.**
- **Observe the regulations to protect against electrostatic and wear an anti-static wrist strap.**

Regular Maintenance and Maintenance Period

Check item	Check method	Maintenance Period
System cleaning	Check whether the air outlet and heat sink are blocked by dust and other objects. Clean the air outlet and the heat sink if necessary.	Once per six months to a year (- depending on the amount of dust in the working environment)
Cable inlet hole	Check whether the cable inlet hole of the device is fully sealed. If not, fill the crack with fireproof and waterproof materials.	Once a year
Electrical connection	Check whether cables are loose or fall off. Check whether the cable is damaged, especially the part in contact with the metal enclosure.	Once per six months to a year

11.5 Cabinet Maintenance

11.5.1 Cleaning Enclosure

If there is rust on the outer surface of the BESS, clear it with abrasive paper or brush.

Clean the outer surfaces of the BESS with a mop or large cleaning cloth in the event of heavy dust thereon.

Clean the top and then the sides. Wash it directly, or wash and flush with water simultaneously.

11.5.2 Checking Door Locks and Hinges

Check whether the door locks and hinges of the inverter can be used normally after cleaning. Lubricate the door lock holes and hinges properly when necessary.

11.5.3 Checking Sealing Strips

If the sealing strip is in good condition, it can effectively prevent water seepage inside the container. Therefore, carefully check the sealing strip and replace it immediately if there is any damage.

11.5.4 Paint Repair

Inspect the appearance of the box:

Case 1: Dirt on surface caused by water spots and dusts can be cleaned.


Case 2: Surface dirt and damaged finish, which cannot be cleaned.

Case 3: Primer is damaged, and the base material is exposed.

Maintenance steps for Case I:

Material:




- Cleaning cloth
- Water
- Alcohol or other non-corrosive detergent

Graphics	Step
	<p>1. Wet the cleaning cloth (or other scrubbing tools) with water, and scrub the dirty parts on surface.</p> <hr/> <p>2. If the dirt cannot be cleaned with water, scrub with 97% alcohol till the surface is acceptable. (Or try to use non-corrosive detergents that are generally used locally)</p>

Maintenance steps for Case II:

Material:





- Abrasive paper
- Cleaning cloth
- Water
- Alcohol
- Brush
- Oil paint

Graphics	Step
	<p>1. Polish the paint surface with blistering or scratches with an abrasive paper for a smooth surface.</p>
	<p>2. Wet the cleaning cloth with water or 97% alcohol, and scrub the damaged parts to remove surface stains.</p>
	<p>3. Perform paint repair for the scratched parts with a soft brush after the surface is dried; Brush the paint as uniform as possible.</p>

Maintenance steps for Case III:

Material:

- Abrasive paper
- Cleaning cloth
- Water
- Alcohol
- Zinc primer
- Brush
- Oil paint

Graphics	Step
	<p>1. Polish the damaged parts with an abrasive paper to remove rust and other burrs for a smooth surface</p>
	<p>2. Wet the cleaning cloth with water or 97% alcohol, and scrub the damaged parts to remove surface stains and dust.</p>
	<p>3. Spray the parts with base material exposed with zinc primer for protection after drying of the surface. Ensure to cover the bare base material completely.</p>
	<p>4. Perform paint repair for the damaged parts with soft brush after the primer is dried, and brush the paint uniformly.</p>



Check whether the protective paint sprayed on casing of the integrated BESS fell off or peeled off; if so, repair it timely.

Spray a special protective paint to the exterior of the integrated BESS every 5 years.

11.6 Battery Maintenance

11.6.1 Regular Maintenance and Maintenance Period

The following provides the recommended maintenance periods. The actual maintenance period shall be adjusted reasonably in consideration of the specific installation environment of the product.

Factors like the power plant scale, the location, and the site environment can affect the maintenance period of the product. It is necessary to shorten the maintenance period and increase the maintenance frequency in the event of heavy sandstorm or dust in the operation environment.

Maintenance Once Every Two Years

Check item	Check method
RACK status and cleaning	<p>Check the following items, and correct immediately those failing to meet relevant requirements:</p> <ul style="list-style-type: none"> • Check whether there is any damage or deformation of the RACK and internal devices. • Check if there is abnormal noise during operation of internal devices. • Check whether the temperature in the RACK is excessively high. • Check whether the humidity and the amount of dust inside the RACK are within the normal range. Clean the equipment if necessary. • Check whether the air inlet and outlet of the RACK are blocked.
Warning marks	Check whether the warning labels and marks are clearly visible and free of stains and damage. Replace them if necessary.
Wiring and cables	Check the switch gear and the battery module, and whether the battery modules are connected correctly.
Corrosion	Check whether there is oxidation or rust inside the RACK.

Maintenance Once A Year

Check item	Check method
Switch gear and the enclosure of the battery module	<p>Check the following items, and correct immediately those failing to meet relevant requirements:</p> <ul style="list-style-type: none"> • Check whether there are flammable objects on the top of the RACK. • Check whether the welding between the RACK and the foundation steel plate is firm and whether there is rust at the welding points. • Check whether there is any damage, flaking paint or sign of oxidization on the enclosure. • Check whether there are foreign objects, dust, dirt, and condensed water inside the RACK.
Wiring and cable layout	<p>Completely power off the devices inside the RACK before checking.</p> <p>For any non-conformances found during inspection, correct them immediately.</p> <ul style="list-style-type: none"> • Check whether the cable layout is normal and whether there is a short circuit. For any non-conformances found during inspection, correct them immediately. • Check whether all inlet and outlet holes are well sealed. • Check whether there is water seepage inside the RACK. • Check whether the power cables and the copper bar are loose, and fasten them again by the torque specified previously. • Check whether the power cables and communication cables are damaged, especially the part in contact with the metal enclosure.
Ground connection	<p>Check whether the ground connection is correct and the grounding resistance shall be no more than 4Ω.</p>
Fan	<ul style="list-style-type: none"> • Check the fan for faults, such as stalling or stopping. • Check whether there is abnormal noise during operation of the fans.
Screw	<p>Check whether the internal screws fell off or corroded.</p>

Maintenance Every Six Months to A Year

Check item	Check method
Ambient temperature and humidity	<ul style="list-style-type: none"> • Check the ambient temperature record and check whether the temperature is within the allowable range. • Check the ambient humidity record and check whether the humidity is within the allowable range.
Functions	<ul style="list-style-type: none"> • Check the working status of the DC contactor: In the case of shutdown, issue an open/close command to check whether the contactor is normal. • Measure whether the 24V output voltage is within the specified range. • Check the operation record of the RACK and check whether the current, voltage and temperature are within the allowable range.

11.6.2 Maintenance Notices

For safe and effective maintenance of the system, maintenance personnel are requested to carefully read and observe the following safety requirements.

- 1 Hold an electrician's license issued by the Safety Supervision Bureau and pass the professional training before starting work.
- 2 Observe related safety precautions, use necessary tools, and wear personal protective equipment.
- 3 It is strictly forbidden to wear jewelry or metal accessories such as watches.
- 4 It is strictly forbidden to touch the HV positive and negative poles of the BESS with both hands at the same time.
- 5 Disconnect all HV and LV switches before maintaining the BESS.
- 6 It is strictly forbidden to clean the BESS with water directly. Use a vacuum cleaner if necessary.
- 7 Do not use brute force or violence when plugging or unplugging cables.
- 8 Clean up tools and materials after maintenance and check if there are any metal objects left inside or on top of the equipment.
- 9 If there is any question about the operation and maintenance of the equipment, please contact Sungrow Customer Service. It is strictly forbidden to operate the equipment arbitrarily.

11.6.3 Maintenance

- 1 Operating temperature: The working temperature should be kept between 0°C to 45°C. The temperature charging and discharging should be 15°C to 30°C and typically 25°C.

- 2 The RACK should not be charged or discharged with high magnifying power. The continuous charging and discharging current of a single rack should not exceed 140A.
- 3 When the energy storage system is not used in a long time, it should be charged once every six months, until its SOC is 30% to 40%.
- 4 When the system is used after long-term storage, it should be fully charged at least once to restore the best performance of the battery.
- 5 Regularly check whether the air duct of the cooling system is blocked and clean the system. In particular, clean the air inlet and outlet of the fan and use a vacuum cleaner if necessary, to maintain free air circulation inside the cabinet. Before dust removal, the power supply must be cut off. It is forbidden to rinse the system with water.
- 6 Regularly check whether the fastening bolts of the high-voltage cables and connecting busbars of the energy storage system are loose, whether the contacts are in good conditions, and whether the terminal surfaces are severely corroded or oxidized.
- 7 Regularly check the protective covers of high-voltage positive and negative electrodes of the PACK for ageing, damage and missing.
- 8 Regularly check cables for loosening, ageing, damage and fracture and inspect whether the insulation is in good conditions.
- 9 Regularly check the battery cabinet for pungent odor and high-voltage connections for burning odor.
- 10 Regularly check whether the voltage, temperature and other data of the monitoring upper computer are correct and whether there are fault alarms in the alarm column.
- 11 Regularly check whether the status and alarm indicators of the energy storage system are in good conditions and whether they work properly.
- 12 Regularly check whether the emergency stop button of the energy storage system can be used, in order to quickly shut down the system in an emergency.
- 13 Regularly check whether the fire extinguishers are in good conditions and within the validity period.
- 14 Never use different types of battery modules in series or parallel.

⚠ WARNING

- **The battery is potentially dangerous, so appropriate protective measures must be taken during operation and maintenance!**
- **Incorrect operation may cause severe personal injury and property damage!**
- **Use the appropriate tools and protective equipment during battery operation.**
- **Battery maintenance must be performed by those who have battery expertise and received safety training.**

11.7 Coolant Replacement

Object	Standard	Period	Tools
Coolant	1. There are obvious impurities in antifreeze; 2. Antifreeze turns from pink to dark red.	5-6 years	Water pump, hose, hose clamp, slotted screwdriver Note: Please contact Sungrow Customer Service to replace hardware facilities

12 Appendix

12.1 System Parameters

table 12-1 ST2752UX-US/ST2695UX-US

Parameter	ST2752UX-US	ST2695UX-US
Battery Data		
Cell type	LFP	
Battery capacity (BOL)	2752 kWh	2695 kWh
System output voltage range	1160 ~ 1500 V	1160 ~ 1500 V
General Data		
Dimensions of battery unit (W * H * D)	9340*2600*1730mm	
Weight of battery unit	26,400 kg	26,000 kg
Degree of protection	IP 54/Type 3R	
Operating temperature range	-30 to 50°C (> 45°C derating)	
Relative humidity	0 ~ 95 % (non-condensing)	
Max. working altitude	3000m	
Cooling concept of battery chamber	Liquid cooling	
Fire safety standard/Optional	Deluge sprinkler heads (standard), Fused sprinkler heads (optional),NFPA69 explosion prevention and ventillation IDLH gases(optional)	
Communication interfaces	RS485, Ethernet	
Communication protocols	Modbus RTU, Modbus TCP	
Compliance	UL9540,UL9540A/NFPA 855	

table 12-2 ST2637UX-US/ST2580UX-US

Parameter	ST2637UX-US	ST2580UX-US
Battery Data		
Cell type	LFP	
Battery capacity (BOL)	2637 kWh	2580 kWh
System output voltage range	1160 ~ 1500 V	1160 ~ 1500 V
General Data		
Dimensions of battery unit (W * H * D)	9340*2600*1730mm	
Weight of battery unit	25,600 kg	25,200 kg
Degree of protection	IP 54/Type 3R	
Operating temperature range	-30 to 50°C (> 45°C derating)	
Relative humidity	0 ~ 95 % (non-condensing)	
Max. working altitude	3000m	
Cooling concept of battery chamber	Liquid cooling	
Fire safety standard/Optional	Deluge sprinkler heads (standard), Fused sprinkler heads (optional),NFPA69 explosion prevention and ventillation IDLH gases(optional)	
Communication interfaces	RS485, Ethernet	
Communication protocols	Modbus RTU, Modbus TCP	
Compliance	UL9540,UL9540A/NFPA 855	

table 12-3 ST2523UX-US/ST2465UX-US

Parameter	ST2523UX-US	ST2465UX-US
Battery Data		
Cell type	LFP	
Battery capacity (BOL)	2523 kWh	2465 kWh
System output voltage range	1160 ~ 1500 V	1160 ~ 1500 V

Parameter	ST2523UX-US	ST2465UX-US
General Data		
Dimensions of battery unit (W * H * D)	9340*2600*1730mm	
Weight of battery unit	24,800 kg	24,400 kg
Degree of protection	IP 54/Type 3R	
Operating temperature range	-30 to 50°C (> 45°C derating)	
Relative humidity	0 ~ 95 % (non-condensing)	
Max. working altitude	3000m	
Cooling concept of battery chamber	Liquid cooling	
Fire safety standard/ Optional	Deluge sprinkler heads (standard), Fused sprinkler heads (optional), NFPA69 explosion prevention and ventilation IDLH gases(optional)	
Communication interfaces	RS485, Ethernet	
Communication protocols	Modbus RTU, Modbus TCP	
Compliance	UL9540, UL9540A/NFPA 855	

table 12-4 ST2408UX-US/ST2351UX-US

Parameter	ST2408UX-US	ST2351UX-US
Battery Data		
Cell type	LFP	
Battery capacity (BOL)	2408 kWh	2351 kWh
System output voltage range	1160 ~ 1500 V	1160 ~ 1500 V
General Data		
Dimensions of battery unit (W * H * D)	9340*2600*1730mm	
Weight of battery unit	24,000 kg	23,600 kg
Degree of protection	IP 54/Type 3R	

Parameter	ST2408UX-US	ST2351UX-US
Operating temperature range	-30 to 50°C (> 45°C derating)	
Relative humidity	0 ~ 95 % (non-condensing)	
Max. working altitude	3000m	
Cooling concept of battery chamber	Liquid cooling	
Fire safety standard/ Optional	Deluge sprinkler heads (standard), Fused sprinkler heads (optional),NFPA69 explosion prevention and ventilation IDLH gases(optional)	
Communication interfaces	RS485, Ethernet	
Communication protocols	Modbus RTU, Modbus TCP	
Compliance	UL9540,UL9540A/NFPA 855	

table 12-5 ST2293UX-US

Parameter	ST2293UX-US
Battery Data	
Cell type	LFP
Battery capacity (BOL)	2293 kWh
System output voltage range	1160 ~ 1500 V
General Data	
Dimensions of battery unit (W * H * D)	9340*2600*1730mm
Weight of battery unit	23,200 kg
Degree of protection	IP 54/Type 3R
Operating temperature range	-30 to 50°C (> 45°C derating)
Relative humidity	0 ~ 95 % (non-condensing)
Max. working altitude	3000m
Cooling concept of battery chamber	Liquid cooling

Parameter	ST2293UX-US
Fire safety standard/ Optional	Deluge sprinkler heads (standard), Fused sprinkler heads (optional),NFPA69 explosion prevention and ventillation IDLH gases(optional)
Communication interfaces	RS485, Ethernet
Communication protocols	Modbus RTU, Modbus TCP
Compliance	UL9540,UL9540A/NFPA 855

12.2 Tightening Torque

To prevent the copper crimp terminals from being loosened by the force, thus causing poor contact, and to avoid heat or even fire due to increased contact resistance, ensure that the following torque requirements are met when fastening the screws of the copper crimp terminals.

Screw	Torque (N·m)	Screw	Torque (N·m)
M3	0.7 ~ 1	M8	18 ~ 23
M4	1.8 ~ 2.4	M10	34 ~ 40
M5	4 ~ 4.8	M12	60 ~ 70
M6	7 ~ 8	M16	119 ~ 140

To reduce the stress on the copper crimp terminal, fix the cable at an appropriate position.

12.3 Quality Assurance

When any product fault occurs during the warranty period, Sungrow Power Supply Co., Ltd. (Hereinafter refer to as Company) will maintain or replace the product for free.

Evidence

During Company's warranty period, the custom shall provide the product purchase invoice and date. Meanwhile the trademark should be clearly legible. Otherwise Company has the right to exclude liability claims.

Conditions

- After replacement, unqualified products shall be processed by the Company.
- The customer shall give the Company a reasonable period to repair the faulty device.

Exclusion of Liability

In the following circumstances, the Company has the right to refuse to honor the quality guarantee:

- If the free warranty periods for the whole machine/components have expired.
- The equipment is damaged during transportation.

- If the device was incorrectly installed, refitted, or used.
- The equipment operates under harsh conditions beyond those described in this document.
- If the fault or damage was caused by installation, repairs, modification, or disassembly performed by a service provider or personnel other than this Company.
- If the equipment is installed and used beyond stipulations of relevant international standards.
- If the damage was caused by an abnormal natural environment.

If the customer requires maintenance of faulty products in any of above cases, the paid maintenance service may be provided following the judgment of the Company's service institution.



If the size and parameters of the product are changed, the latest information of the Company will prevail without notice.

12.4 Contact Information

If you have any questions about this product, please reach out to us. In order to be more responsive and provide you with better service, please offer the following information:

- Device model
- Device SN
- Fault code/name
- Brief description of fault phenomenon

HQ Tel: 0551 - 6532 7878 / 0551 - 6532 7877

For more contact information, see <https://www.sungrowpower.com/headquarter.html>

SUNGROW

Sungrow Power Supply Co., Ltd.
www.sungrowpower.com

KCE CT 5 System Operations and Maintenance Plan

The System Operations and Maintenance (O&M) Plan is based on the Systems Manual from the battery equipment vendor in Exhibit J, as well as general safety standards and industry best practices. The O&M plan will be compliant with all appropriate federal, state, and local laws and manufacturers' recommendations. Additionally, the Project O&M Plan will consolidate all necessary and prescribed maintenance schedules for all components in the system. The O&M of the BESS facility will be led by Key Capture Energy's Operations & Maintenance team. The O&M for the generator tie-in will likely be performed by a contracted third-party firm with expertise in medium and high-voltage electrical systems. The KCE Operation & Maintenance Team works diligently to ensure that any concerns are addressed quickly to minimize any downtime of the proposed Project Facilities to ensure that the Facilities continue to operate as expected.

Prior to beginning operation of the Project, the Operation & Maintenance Team will conduct training on system emergency procedures for the Towns of Willington and Stafford public safety personnel and first responders as provided by the system manufacturer. Additionally, the Project will present the host municipalities with a facility equipment layout plan at project completion.

The Project is monitored 24/7 by a remote operations control center (ROCC). The Project will be equipped with Battery Management Software (BMS), informing automated procedures and personnel through supervisory control and data acquisition (SCADA) systems. The BMS continuously monitors a number of battery system data points including, but not limited to, voltage, current, and temperature. The ROCC continuously monitors the SCADA systems, with appropriate notifications made to the required entities to ensure the issue is dealt with both safely and timely in the event of an abnormal data point. Local emergency services will also be notified in the case of a fire alarm at the BESS. The system can also shut down the BESS and disconnect the battery racks from the inverters in an emergency. The ROCC would notify all required entities which would allow Eversource to (1) disconnect the project from the local distribution network remotely and (2) dispatch a line crew to the site. Only upon a KCE representative deeming the site safe to enter would anyone be allowed inside the fence. A site-level fire panel also aggregates data from each of the battery containers for review of any on-site responders.

During the operational period, the access road shall be maintained and cleared of snow to ensure safe access to the site.

During operations, the planned maintenance schedules will include work for preventative maintenance, inspections, and any other work able to be planned in advance. All work planned will be done in accordance with the manufacturers' recommendation as well as all safety best practices and industry best practices. Maintenance records will be maintained and recorded for all preventative and reactive maintenance performed on the system. This may include but not be limited to:

- General facility inspection and maintenance
- BESS preventative maintenance
- Power conversion system (inverter) preventative maintenance
- Switchgear/medium voltage equipment preventative maintenance
- Medium-Voltage Vacuum CB preventative inspection

- Fire suppression system testing, inspections, and preventative maintenance

Please note that all items referenced herein are dependent upon the design as completed in the detailed construction engineering to be finalized after receipt of all approvals. As such, the System Operations and Maintenance Plan is anticipated to be finalized in Q4, 2024. KCE and their suppliers/contractors shall maintain industry best practices as it relates to the construction, commissioning, and operation of the project and will work closely with the integrator to ensure that proper testing is done.



U.S. ENVIRONMENTAL PROTECTION AGENCY TIER I QUALIFIED FACILITY SPCC PLAN TEMPLATE

Instructions to Complete this Template

This template is intended to help the owner or operator of a Tier I qualified facility develop a self-certified Spill Prevention, Control, and Countermeasure (SPCC) Plan. To use this template, your facility must meet all of the applicability criteria of a Tier I qualified facility listed under §112.3(g)(1) of the SPCC rule. This template provides every SPCC rule requirement necessary for a Tier I qualified facility, which you must address and implement.

You may use this template to comply with the SPCC regulation or use it as a model and modify it as necessary to meet your facility-specific needs. If you modify the template, your Plan must include a section cross-referencing the location of each applicable requirement of the SPCC rule and you must ensure that your Plan is an equivalent Plan that meets all applicable rule requirements of 40 CFR 112.6(a)(3).

You may complete this template either electronically or by hand on a printed copy. This document is a reformatted version of the template found in Appendix G of 40 CFR part 112.^a No substantive changes have been made. Please note that a "Not Applicable" ("N/A") column has been added to both Table G-10 (General Rule Requirements for Onshore Facilities) and Table G-11 (General Rule Requirements for Onshore Oil Production Facilities). The "N/A" column should help you complete your self-certification when a required rule element does not apply to your facility. Use of the "N/A" column is optional and is not required by rule.

All Tier I qualified facility self-certifiers must complete Sections I, II, and III. Additionally, the owner or operator of an:

- Onshore facility (excluding production) must complete Section A.
- Onshore oil production facility (excluding drilling and workover facilities) must complete Section B.
- Onshore oil drilling and workover facility must complete Section C.

Complete and include with your Plan the appropriate attachments. You should consider printing copies of the attachments for use in implementing the SPCC Plan (e.g. Attachment 3.1 - Inspection Log & Schedule; Attachment 4 - Discharge Notification Form).

To complete the template, check the box next to the requirement to indicate that it has been adequately addressed. Either write "N/A" in the column or check the box under the "N/A" column to indicate those requirements that are not applicable to the facility. Where a section requires a description or listing, write in the spaces provided (or attach additional descriptions if more space is needed).

Below is a key for the colors used in the section headers:

Sections I, II, and III: Required for all Tier I qualified facilities
Section A: Onshore facilities (excluding production)
Section B: Onshore oil production facilities (excluding drilling and workover facilities)
Section C: Onshore oil drilling and workover facilities
Attachments: 1 - Five Year Review and Technical Amendment Logs 2 - Oil Spill Contingency Plan and Checklist 3 - Inspections, Dike Drainage and Personnel Training Logs 4 - Discharge Notification Form

After you have completed all appropriate sections, certify and date your Plan, and then implement it by the compliance date. If your facility was in operation before August 16, 2002, and you do not already have a Plan, then implement this template immediately. Conduct inspections and tests in accordance with the written procedures that you have developed for your facility. You must keep with the SPCC Plan a record of these inspections and tests, signed by the appropriate supervisor or inspector, for a period of three years.

Do not forget to periodically review your Plan (at least once every five years) or to update it when you make changes to your facility. You must prepare amendments within six months of the facility change, and implement them as soon as possible, but not later than six months following preparation of any amendment.

In the event that your facility releases oil to navigable waters or adjoining shorelines, immediately call the National Response Center (NRC) at 1-800-424-8802. The NRC is the federal government's centralized reporting center, which is staffed 24 hours per day by U.S. Coast Guard personnel.

^a Please note that the use of this template is not mandatory for a Tier I qualified facility. You may also meet the SPCC Plan requirement by preparing a satisfactory Tier II qualified facility Plan, preparing a satisfactory Plan that is certified by a Professional Engineer, or by developing an equivalent Plan for a Tier I qualified facility. Further information on the requirements of these methods can be found in 40 CFR part 112.6(a)(1). If you use any of these alternative methods you must include a cross reference in your Plan that shows how the equivalent Plan meets all applicable 40 CFR part 112 requirements.

Tier I Qualified Facility SPCC Plan

This template constitutes the SPCC Plan for the facility, when completed and signed by the owner or operator of a facility that meets the applicability criteria in §112.3(g)(1). This template addresses the requirements of 40 CFR part 112. Maintain a complete copy of the Plan at the facility if the facility is normally attended at least four hours per day, or for a facility attended fewer than four hours per day, at the nearest field office. When making operational changes at a facility that are necessary to comply with the rule requirements, the owner/operator should follow state and local requirements (such as for permitting, design and construction) and obtain professional assistance, as appropriate.

Facility Description

Facility Name KCE CT 5, LLC

Facility Address Village Hill Rd

City Willington State CT ZIP 06279

County Tolland Tel. Number () - TBD

Owner or Operator Name KCE CT 5, LLC

Owner or Operator Address 25 Monroe St

City Albany State NY ZIP 12210

County Albany Tel. Number (516) 279 - 2955

I. Self-Certification Statement (§112.6(a)(1))

The owner or operator of a facility certifies that each of the following is true in order to utilize this template to comply with the SPCC requirements:

I _____ certify that the following is accurate:

1. I am familiar with the applicable requirements of 40 CFR part 112;
2. I have visited and examined the facility;
3. This Plan was prepared in accordance with accepted and sound industry practices and standards;
4. Procedures for required inspections and testing have been established in accordance with industry inspection and testing standards or recommended practices;
5. I will fully implement the Plan;
6. This facility meets the following qualification criteria (under §112.3(g)(1)):
 - a. The aggregate aboveground oil storage capacity of the facility is 10,000 U.S. gallons or less; and
 - b. The facility has had no single discharge as described in §112.1(b) exceeding 1,000 U.S. gallons and no two discharges as described in §112.1(b) each exceeding 42 U.S. gallons within any twelve month period in the three years prior to the SPCC Plan self-certification date, or since becoming subject to 40 CFR part 112 if the facility has been in operation for less than three years (not including oil discharges as described in §112.1(b) that are the result of natural disasters, acts of war, or terrorism); and
 - c. There is no individual oil storage container at the facility with an aboveground capacity greater than 5,000 U.S. gallons.
7. This Plan does not deviate from any requirement of 40 CFR part 112 as allowed by §112.7(a)(2) (environmental equivalence) and §112.7(d) (impracticability of secondary containment) or include any measures pursuant to §112.9(c)(6) for produced water containers and any associated piping;
8. This Plan and individual(s) responsible for implementing this Plan have the full approval of management and I have committed the necessary resources to fully implement this Plan.

I also understand my other obligations relating to the storage of oil at this facility, including, among others:

1. To report any oil discharge to navigable waters or adjoining shorelines to the appropriate authorities. Notification information is included in this Plan.
2. To review and amend this Plan whenever there is a material change at the facility that affects the potential for an oil discharge, and at least once every five years. Reviews and amendments are recorded in an attached log [See Five Year Review Log and Technical Amendment Log in Attachments 1.1 and 1.2.]
3. Optional use of a contingency plan. A contingency plan:
 - a. May be used in lieu of secondary containment for qualified oil-filled operational equipment, in accordance with the requirements under §112.7(k), and;
 - b. Must be prepared for flowlines and/or intra-facility gathering lines which do not have secondary containment at an oil production facility, and;
 - c. Must include an established and documented inspection or monitoring program; must follow the provisions of 40 CFR part 109; and must include a written commitment of manpower, equipment and materials to expeditiously remove any quantity of oil discharged that may be harmful. If applicable, a copy of the contingency plan and any additional documentation will be attached to this Plan as Attachment 2.

I certify that I have satisfied the requirement to prepare and implement a Plan under §112.3 and all of the requirements under §112.6(a). I certify that the information contained in this Plan is true.

Signature _____

Title: _____

Name _____

Date: ____ / ____ / 20____

II. Record of Plan Review and Amendments

Five Year Review (§112.5(b)):

Complete a review and evaluation of this SPCC Plan at least once every five years. As a result of the review, amend this Plan within six months to include more effective prevention and control measures for the facility, if applicable. Implement any SPCC Plan amendment as soon as possible, but no later than six months following Plan amendment. Document completion of the review and evaluation, and complete the Five Year Review Log in Attachment 1.1. If the facility no longer meets Tier I qualified facility eligibility, the owner or operator must revise the Plan to meet Tier II qualified facility requirements, or complete a full PE certified Plan.

Table G-1 Technical Amendments (§§112.5(a), (c) and 112.6(a)(2))	
This SPCC Plan will be amended when there is a change in the facility design, construction, operation, or maintenance that materially affects the potential for a discharge to navigable waters or adjoining shorelines. Examples include adding or removing containers, reconstruction, replacement, or installation of piping systems, changes to secondary containment systems, changes in product stored at this facility, or revisions to standard operating procedures.	<input checked="" type="checkbox"/>
Any technical amendments to this Plan will be re-certified in accordance with Section I of this Plan template. [§112.6(a)(2)] [See Technical Amendment Log in Attachment 1.2]	<input checked="" type="checkbox"/>

III. Plan Requirements

1. Oil Storage Containers (§112.7(a)(3)(i)):

Table G-2 Oil Storage Containers and Capacities		
This table includes a complete list of all oil storage containers (aboveground containers ^a and completely buried tanks ^b) with capacity of 55 U.S. gallons or more, unless otherwise exempt from the rule. For mobile/portable containers, an estimated number of containers, types of oil, and anticipated capacities are provided.		<input type="checkbox"/>
Oil Storage Container <i>(indicate whether aboveground (A) or completely buried (B))</i>	Type of Oil	Shell Capacity (gallons)
Medium Voltage Transformer #1	FR3	660.43
Medium Voltage Transformer #2	FR3	660.43
Auxiliary transformer	FR3	607

Total Aboveground Storage Capacity ^c 1927.86 gallons
Total Completely Buried Storage Capacity 0 gallons
Facility Total Oil Storage Capacity 1927.86 gallons

^a Aboveground storage containers that must be included when calculating total facility oil storage capacity include: tanks and mobile or portable containers; oil-filled operational equipment (e.g. transformers); other oil-filled equipment, such as flow-through process equipment. Exempt containers that are not included in the capacity calculation include: any container with a storage capacity of less than 55 gallons of oil; containers used exclusively for wastewater treatment; permanently closed containers; motive power containers; hot-mix asphalt containers; heating oil containers used solely at a single-family residence; and pesticide application equipment or related mix containers.

^b Although the criteria to determine eligibility for qualified facilities focuses on the aboveground oil storage containers at the facility, the completely buried tanks at a qualified facility are still subject to the rule requirements and must be addressed in the template; however, they are not counted toward the qualified facility applicability threshold.

^c Counts toward qualified facility applicability threshold.

2. Secondary Containment and Oil Spill Control (§§112.6(a)(3)(i) and (ii), 112.7(c) and 112.9(c)(2)):

Table G-3 Secondary Containment and Oil Spill Control	
Appropriate secondary containment and/or diversionary structures or equipment ^a is provided for all oil handling containers, equipment, and transfer areas to prevent a discharge to navigable waters or adjoining shorelines. The entire secondary containment system, including walls and floor, is capable of containing oil and is constructed so that any discharge from a primary containment system, such as a tank or pipe, will not escape the containment system before cleanup occurs.	<input type="checkbox"/>

^a Use one of the following methods of secondary containment or its equivalent: (1) Dikes, berms, or retaining walls sufficiently impervious to contain oil; (2) Curbing; (3) Culverting, gutters, or other drainage systems; (4) Weirs, booms, or other barriers; (5) Spill diversion ponds; (6) Retention ponds; or (7) Sorbent materials.

Table G-4 below identifies the tanks and containers at the facility with the potential for an oil discharge; the mode of failure; the flow direction and potential quantity of the discharge; and the secondary containment method and containment capacity that is provided.

Table G-4 Containers with Potential for an Oil Discharge					
Area	Type of failure (discharge scenario)	Potential discharge volume (gallons)	Direction of flow for uncontained discharge	Secondary containment method ^a	Secondary containment capacity (gallons)
<i>Bulk Storage Containers and Mobile/Portable Containers^b</i>					
<i>Oil-filled Operational Equipment (e.g., hydraulic equipment, transformers)^c</i>					
Medium Voltage Transformer	Equipment seal failures	660	south	Sorbent materials	
Medium Voltage Transformer	Equipment seal failures	660	south	Sorbent materials	
Auxillary Transformer	Equipment seal failures	607	south	Sorbent materials	
<i>Piping, Valves, etc.</i>					
<i>Product Transfer Areas (location where oil is loaded to or from a container, pipe or other piece of equipment.)</i>					
<i>Other Oil-Handling Areas or Oil-Filled Equipment (e.g. flow-through process vessels at an oil production facility)</i>					

^a Use one of the following methods of secondary containment or its equivalent: (1) Dikes, berms, or retaining walls sufficiently impervious to contain oil; (2) Curbing; (3) Culverting, gutters, or other drainage systems; (4) Weirs, booms, or other barriers; (5) Spill diversion ponds; (6) Retention ponds; or (7) Sorbent materials.

^b For storage tanks and bulk storage containers, the secondary containment capacity must be at least the capacity of the largest container plus additional capacity to contain rainfall or other precipitation.

^c For oil-filled operational equipment: Document in the table above if alternative measures to secondary containment (as described in §112.7(k)) are implemented at the facility.

3. Inspections, Testing, Recordkeeping and Personnel Training (§§112.7(e) and (f), 112.8(c)(6) and (d)(4), 112.9(c)(3), 112.12(c)(6) and (d)(4)):

Table G-5 Inspections, Testing, Recordkeeping and Personnel Training	
An inspection and/or testing program is implemented for all aboveground bulk storage containers and piping at this facility. [§§112.8(c)(6) and (d)(4), 112.9(c)(3), 112.12(c)(6) and (d)(4)]	<input checked="" type="checkbox"/>
<p>The following is a description of the inspection and/or testing program (e.g. reference to industry standard utilized, scope, frequency, method of inspection or test, and person conducting the inspection) for all aboveground bulk storage containers and piping at this facility:</p> <p>Routine Inspections</p> <p>Periodic (at least quarterly) and Annual inspections are to be performed using forms in the Appendices of this plan or other appropriate written or electronic inspection documents.</p> <p>The Facility owner/operator will perform frequent informal inspections by conducting a walk- through of the Facility, checking the following:</p> <ul style="list-style-type: none"> • Visually inspecting general area of the Facility for any indications of leaks. • Visually inspecting oil-filled electrical equipment for indications of leaks or spills. • Visually inspecting oil-filled electrical equipment for defects that may result in a release of oil. • Visually inspecting Facility fencing, gates, and access points to ensure proper security is maintained. <p>Any issues or concerns identified during routine inspections must be mitigated or corrected promptly. Contact the Facility's Operations & Maintenance team to report unsafe conditions or if there appears to be a potential for an oil release.</p> <p>Oil-Filled Electrical Equipment</p> <p>General containment for the Facility's oil-filled operational equipment is provided by active containment via the application of sorbent materials as well as the implementation of an oil spill contingency plan and a written commitment of manpower equipment and materials. In general, the owner or operator of the Facility will implement the following procedures as active secondary containment.</p> <ul style="list-style-type: none"> • Periodically and on a regular schedule visually inspect and/or test oil-filled electrical equipment and associated component for leaks, corrosion, or other conditions that could lead to a discharge, • Take corrective action or make repairs to equipment and any associated components as indicated by regularly scheduled visual inspections, tests, or evidence of an oil discharge, • Promptly initiate actions to contain, remove and remediate oil discharges, and • If the Facility discharges more than 1,000 U.S. gallons of oil in a single discharge, or discharges more than 42 U.S. gallons of oil in each of two discharges within any twelve- month period, (excluding discharges that are the result of natural disasters, acts of war, or terrorism) then, within six months of the discharge at the Facility, ensure that all oil-filled electrical equipment have secondary containment 	
Inspections, tests, and records are conducted in accordance with written procedures developed for the facility. Records of inspections and tests kept under usual and customary business practices will suffice for purposes of this paragraph. [§112.7(e)]	<input checked="" type="checkbox"/>
A record of the inspections and tests are kept at the facility or with the SPCC Plan for a period of three years. [§112.7(e)] [See Inspection Log and Schedule in Attachment 3.1]	<input checked="" type="checkbox"/>
Inspections and tests are signed by the appropriate supervisor or inspector. [§112.7(e)]	<input checked="" type="checkbox"/>
Personnel, training, and discharge prevention procedures [§112.7(f)]	
Oil-handling personnel are trained in the operation and maintenance of equipment to prevent discharges; discharge procedure protocols; applicable pollution control laws, rules, and regulations; general facility operations; and, the contents of the facility SPCC Plan. [§112.7(f)]	<input checked="" type="checkbox"/>
A person who reports to facility management is designated and accountable for discharge prevention. [§112.7(f)] Name/Title: <u>TBD</u>	<input checked="" type="checkbox"/>
Discharge prevention briefings are conducted for oil-handling personnel annually to assure adequate understanding of the SPCC Plan for that facility. Such briefings highlight and describe past reportable discharges or failures, malfunctioning components, and any recently developed precautionary measures. [§112.7(f)] [See Oil-handling Personnel Training and Briefing Log in Attachment 3.4]	<input checked="" type="checkbox"/>

4. Security (excluding oil production facilities) §112.7(g):

Table G-6 Implementation and Description of Security Measures	
Security measures are implemented at this facility to prevent unauthorized access to oil handling, processing, and storage area.	☒
<p>The following is a description of how you secure and control access to the oil handling, processing and storage areas; secure master flow and drain valves; prevent unauthorized access to starter controls on oil pumps; secure out-of-service and loading/unloading connections of oil pipelines; address the appropriateness of security lighting to both prevent acts of vandalism and assist in the discovery of oil discharges:</p> <p>The following security measures are provided for the Facility:</p> <ul style="list-style-type: none"> • Controlled access to the interior of the Facility via chain-link fencing and locking gates. • Controlled access to oil-filled components of electrical transformers via locked exterior metal casings. • Facility lighting which reduces the potential for acts of vandalism and assists in the discovery/prevention of oil discharges. 	

5. Emergency Procedures and Notifications (§112.7(a)(3)(iv) and 112.7(a)(5)):

Table G-7 Description of Emergency Procedures and Notifications
<p>The following is a description of the immediate actions to be taken by facility personnel in the event of a discharge to navigable waters or adjoining shorelines [§112.7(a)(3)(iv) and 112.7(a)(5)]:</p> <p>Additional procedures, and notification information will be added to this plan prior to start of project construction anticipated Q4 2024. All sections with noted TBD will be completed prior to that time.</p> <ul style="list-style-type: none"> • In the event of an emergency call 911. • If there is not an emergency, contact the company contacts and, when applicable, the clean-up contractors. • If the spill threatens to impact water or results in a sheen on water, then contact the National Response Center. • If the spill is greater than 25 gallons, notify the CT DEEP. • If the spill is greater than 1,000 gallons or is the second release of greater than 42 gallons within a 12 – month period, then a written notification to the EPA Regional Administrator is required within 60days of the spill. <p>Disallow anyone from entering or accessing the spill area. Using banner tape or emergency response agencies will help accomplish this. This can be accomplished through placards, shipping papers, labels, inventory records or Safety Data Sheets (Global Harmonization).</p> <p>Plan offensive mitigation action.</p> <p>Select personal protective equipment based on hazards presented and as directed in the Safety Data Sheets for the spilled material.</p> <p>Eliminate ignition sources.</p> <p>Contain spilled fluids to prevent further spread. If necessary, temporary dikes and emergency pits can be utilized. Facility Management will establish and provide an adequate level of decontamination.</p> <p>Facility Management will ensure appropriate disposal of all recovered fluids and contaminated soil.</p> <p>Conduct emergency-phase closure, if applicable, equipment status evaluation, personnel debriefing, and assignments for post-incident analysis.</p> <p>Document any exposures to personnel. If necessary, perform medical evaluations following the guidance of Safety Data Sheets.</p> <p>Facility Management will schedule a post-incident analysis within 48 hours and inform all personnel involved.</p>

DISCHARGE PREVENTION

Discharge Prevention Measures

Periodic inspections are the main discharge prevention measures. Proper operation and maintenance of Facility equipment is also a major part of discharge prevention at the Facility. Employee training and a company culture of safe work practices complete the most important portions of the Facility discharge prevention measures.

Controls and Countermeasures

In the event of a discharge, discovery would be made by Facility representatives during a routine visit to the Facility. Base material or dirt that covers the ground at the Facility will contain or absorb small spills. The Facility representatives will take appropriate cleanup measures to promptly remove or remediate oil impacted media present on the ground or in containment structures. The designated spill response contractor(s) will conduct response and cleanup of any discharges that leave Facility boundaries or exceed the capability of Facility personnel and equipment. In the event of a spill, corrective actions and/or countermeasures will also be implemented, where appropriate, to prevent future occurrences of spills. Corrective actions will be documented within a report generated and maintained within the Facility records.

Discharge Prediction

The Facility is located on relatively level terrain in a rural area. In the unlikely event of a total release of oil from one of the Facility's oil-filled electrical transformers, the oil would flow to the southwest across the Facility.

Potential releases of oil may be caused by rupture or leakage of equipment due to vandalism, natural disaster, or equipment failure. Because of the spill prevention measures described in this plan, the probability of a spill or release of oil to navigable waters is extremely low.

Given the facility's current spill prevention program (e.g., management practices, and inspection practices), it appears that a natural disaster would be the most likely cause of a major release.

6. Contact List (§112.7(a)(3)(vi)):

Table G-8 Contact List	
Contact Organization / Person	Telephone Number
National Response Center (NRC)	1-800-424-8802
Cleanup Contractor(s) TBD	TBD
Key Facility Personnel	
Designated Person Accountable for Discharge Prevention: TBD	Office: TBD
	Emergency: TBD
	Office:
	Emergency:
	Office:
	Emergency:
	Office:
	Emergency:
State Oil Pollution Control Agencies Connecticut Department of Energy & Environmental Protection Connecticut Poison Control Center	(860) 424-3000 1-800-222-1222
Other State, Federal, and Local Agencies Town of Windsor Locks Emergency Services Dispatch	860-627-1461
Local Fire Department Windsor Locks Fire Department	860-627-1468
Local Police Department Windsor Locks Police Department	860-627-1461
Hospital Hartford Hospital- Emergency	860-545-5000

Other Contact References (e.g., downstream water intakes or neighboring facilities)

7. NRC Notification Procedure (§112.7(a)(4) and (a)(5)):

Table G-9 NRC Notification Procedure	
In the event of a discharge of oil to navigable waters or adjoining shorelines, the following information identified in Attachment 4 will be provided to the National Response Center immediately following identification of a discharge to navigable waters or adjoining shorelines [See Discharge Notification Form in Attachment 4]: [§112.7(a)(4)]	<input type="checkbox"/>
<ul style="list-style-type: none"> • The exact address or location and phone number of the facility; • Date and time of the discharge; • Type of material discharged; • Estimate of the total quantity discharged; • Estimate of the quantity discharged to navigable waters; • Source of the discharge; 	<ul style="list-style-type: none"> • Description of all affected media; • Cause of the discharge; • Any damages or injuries caused by the discharge; • Actions being used to stop, remove, and mitigate the effects of the discharge; • Whether an evacuation may be needed; and • Names of individuals and/or organizations who have also been contacted.

8. SPCC Spill Reporting Requirements (Report within 60 days) (§112.4):

Submit information to the EPA Regional Administrator (RA) and the appropriate agency or agencies in charge of oil pollution control activities in the State in which the facility is located within 60 days from one of the following discharge events:

- A single discharge of more than 1,000 U.S. gallons of oil to navigable waters or adjoining shorelines or
- Two discharges to navigable waters or adjoining shorelines each more than 42 U.S. gallons of oil occurring within any twelve month period

You must submit the following information to the RA:

- (1) Name of the facility;
- (2) Your name;
- (3) Location of the facility;
- (4) Maximum storage or handling capacity of the facility and normal daily throughput;
- (5) Corrective action and countermeasures you have taken, including a description of equipment repairs and replacements;
- (6) An adequate description of the facility, including maps, flow diagrams, and topographical maps, as necessary;
- (7) The cause of the reportable discharge, including a failure analysis of the system or subsystem in which the failure occurred; and
- (8) Additional preventive measures you have taken or contemplated to minimize the possibility of recurrence
- (9) Such other information as the Regional Administrator may reasonably require pertinent to the Plan or discharge

* * * * *

NOTE: Complete one of the following sections (A, B or C) as appropriate for the facility type.

A. Onshore Facilities (excluding production) (§§112.8(b) through (d), 112.12(b) through (d)):

The owner or operator must meet the general rule requirements as well as requirements under this section. Note that not all provisions may be applicable to all owners/operators. For example, a facility may not maintain completely buried metallic storage tanks installed after January 10, 1974, and thus would not have to abide by requirements in §§112.8(c)(4) and 112.12(c)(4), listed below. **In cases where a provision is not applicable, write "N/A".**

Table G-10 General Rule Requirements for Onshore Facilities	N/A
Drainage from diked storage areas is restrained by valves to prevent a discharge into the drainage system or facility effluent treatment system, except where facility systems are designed to control such discharge. Diked areas may be emptied by pumps or ejectors that must be manually activated after inspecting the condition of the accumulation to ensure no oil will be discharged. [§§112.8(b)(1) and 112.12(b)(1)]	<input type="checkbox"/> <input checked="" type="checkbox"/>
Valves of manual, open-and-closed design are used for the drainage of diked areas. [§§112.8(b)(2) and 112.12(b)(2)]	<input type="checkbox"/> <input checked="" type="checkbox"/>
The containers at the facility are compatible with materials stored and conditions of storage such as pressure and temperature. [§§112.8(c)(1) and 112.12(c)(1)]	<input checked="" type="checkbox"/> <input type="checkbox"/>
Secondary containment for the bulk storage containers (including mobile/portable oil storage containers) holds the capacity of the largest container plus additional capacity to contain precipitation. Mobile or portable oil storage containers are positioned to prevent a discharge as described in §112.1(b). [§112.6(a)(3)(ii)]	<input type="checkbox"/> <input checked="" type="checkbox"/>
If uncontaminated rainwater from diked areas drains into a storm drain or open watercourse the following procedures will be implemented at the facility: [§§112.8(c)(3) and 112.12(c)(3)] <ul style="list-style-type: none"> • Bypass valve is normally sealed closed • Retained rainwater is inspected to ensure that its presence will not cause a discharge to navigable waters or adjoining shorelines • Bypass valve is opened and resealed under responsible supervision • Adequate records of drainage are kept [See Dike Drainage Log in Attachment 3.3] 	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
For completely buried metallic tanks installed on or after January 10, 1974 at this facility [§§112.8(c)(4) and 112.12(c)(4)]: <ul style="list-style-type: none"> • Tanks have corrosion protection with coatings or cathodic protection compatible with local soil conditions. • Regular leak testing is conducted. 	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
For partially buried or bunkered metallic tanks [§112.8(c)(5) and §112.12(c)(5)]: <ul style="list-style-type: none"> • Tanks have corrosion protection with coatings or cathodic protection compatible with local soil conditions. 	<input type="checkbox"/> <input checked="" type="checkbox"/>
Each aboveground bulk container is tested or inspected for integrity on a regular schedule and whenever material repairs are made. Scope and frequency of the inspections and inspector qualifications are in accordance with industry standards. Container supports and foundations are regularly inspected. [See Inspection Log and Schedule and Bulk Storage Container Inspection Schedule in Attachments 3.1 and 3.2] [§112.8(c)(6) and §112.12(c)(6)(i)]	<input checked="" type="checkbox"/> <input type="checkbox"/>
Outsides of bulk storage containers are frequently inspected for signs of deterioration, discharges, or accumulation of oil inside diked areas. [See Inspection Log and Schedule in Attachment 3.1] [§§112.8(c)(6) and 112.12(c)(6)]	<input checked="" type="checkbox"/> <input type="checkbox"/>
For bulk storage containers that are subject to 21 CFR part 110 which are shop-fabricated, constructed of austenitic stainless steel, elevated and have no external insulation, formal visual inspection is conducted on a regular schedule. Appropriate qualifications for personnel performing tests and inspections are documented. [See Inspection Log and Schedule and Bulk Storage Container Inspection Schedule in Attachments 3.1 and 3.2] [§112.12(c)(6)(ii)]	<input checked="" type="checkbox"/> <input type="checkbox"/>

Table G-10 General Rule Requirements for Onshore Facilities		N/A
Each container is provided with a system or documented procedure to prevent overfills for the container. Describe:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Liquid level sensing devices are regularly tested to ensure proper operation [See Inspection Log and Schedule in Attachment 3.1]. <i>[\$112.6(a)(3)(iii)]</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Visible discharges which result in a loss of oil from the container, including but not limited to seams, gaskets, piping, pumps, valves, rivets, and bolts are promptly corrected and oil in diked areas is promptly removed. <i>[\$112.8(c)(10) and 112.12(c)(10)]</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Aboveground valves, piping, and appurtenances such as flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces are inspected regularly. [See Inspection Log and Schedule in Attachment 3.1] <i>[\$112.8(d)(4) and 112.12(d)(4)]</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Integrity and leak testing are conducted on buried piping at the time of installation, modification, construction, relocation, or replacement. [See Inspection Log and Schedule in Attachment 3.1] <i>[\$112.8(d)(4) and 112.12(d)(4)]</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

B. Onshore Oil Production Facilities (excluding drilling and workover facilities) (§112.9(b), (c), and (d)):

The owner or operator must meet the general rule requirements as well as the requirements under this section. Note that not all provisions may be applicable to all owners/operators. **In cases where a provision is not applicable, write "N/A".**

Table G-11 General Rule Requirements for Onshore Oil Production Facilities		N/A
At tank batteries, separation and treating areas, drainage is closed and sealed except when draining uncontaminated rainwater. Accumulated oil on the rainwater is returned to storage or disposed of in accordance with legally approved methods. [§112.9(b)(1)]	<input type="checkbox"/>	<input type="checkbox"/>
Prior to drainage, diked areas are inspected and [§112.9(b)(1)]: <ul style="list-style-type: none"> Retained rainwater is inspected to ensure that its presence will not cause a discharge to navigable waters Bypass valve is opened and resealed under responsible supervision Adequate records of drainage are kept [See Dike Drainage Log in Attachment 3.3] 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Field drainage systems and oil traps, sumps, or skimmers are inspected at regularly scheduled intervals for oil, and accumulations of oil are promptly removed [See Inspection Log and Schedule in Attachment 3.1] [§112.9(b)(2)]	<input type="checkbox"/>	<input type="checkbox"/>
The containers used at this facility are compatible with materials stored and conditions of storage. [§112.9(c)(1)]	<input type="checkbox"/>	<input type="checkbox"/>
All tank battery, separation, and treating facility installations (except for flow-through process vessels) are constructed with a capacity to hold the largest single container plus additional capacity to contain rainfall. Drainage from undiked areas is safely confined in a catchment basin or holding pond. [§112.9(c)(2)]	<input type="checkbox"/>	<input type="checkbox"/>
Except for flow-through process vessels, containers that are on or above the surface of the ground, including foundations and supports, are visually inspected for deterioration and maintenance needs on a regular schedule. [See Inspection Log and Schedule in Attachment 3.1] [§112.9(c)(3)]	<input type="checkbox"/>	<input type="checkbox"/>
New and old tank batteries at this facility are engineered/updated in accordance with good engineering practices to prevent discharges including at least one of the following: <ul style="list-style-type: none"> i. adequate container capacity to prevent overflow if regular pumping/gauging is delayed; ii. overflow equalizing lines between containers so that a full container can overflow to an adjacent container; iii. vacuum protection to prevent container collapse; or iv. high level sensors to generate and transmit an alarm to the computer where the facility is subject to a computer production control system. [§112.9(c)(4)] 	<input type="checkbox"/>	<input type="checkbox"/>
Flow-through process vessels and associated components are: <ul style="list-style-type: none"> Are constructed with a capacity to hold the largest single container plus additional capacity to contain rainfall. Drainage from undiked areas is safely confined in a catchment basin or holding pond; [§112.9(c)(2)] and That are on or above the surface of the ground, including foundations and supports, are visually inspected for deterioration and maintenance needs on a regular schedule. [See Inspection Log and Schedule in Attachment 3.1] [§112.9(c)(3)] Or <ul style="list-style-type: none"> Visually inspected and/or tested periodically and on a regular schedule for leaks, corrosion, or other conditions that could lead to a discharge to navigable waters; and Corrective action or repairs are applied to flow-through process vessels and any associated components as indicated by regularly scheduled visual inspections, tests, or evidence of an oil discharge; and Any accumulations of oil discharges associated with flow-through process vessels are promptly removed; and Flow-through process vessels are provided with a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation within six months of a discharge from flow-through process vessels of more than 1,000 U.S. gallons of oil in a single discharge as described in §112.1(b), or a discharge more than 42 U.S. gallons of oil in each of two discharges as described in §112.1(b) within any twelve month period. [§112.9(c)(5)] (Leave blank until such time that this provision is applicable.) 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Table G-11 General Rule Requirements for Onshore Oil Production Facilities		N/A
All aboveground valves and piping associated with transfer operations are inspected periodically and upon a regular schedule. The general condition of flange joints, valve glands and bodies, drip pans, pipe supports, pumping well polish rod stuffing boxes, bleeder and gauge valves, and other such items are included in the inspection. [See Inspection Log and Schedule in Attachment 3.1] [§112.9(d)(1)]	<input type="checkbox"/>	<input type="checkbox"/>
An oil spill contingency plan and written commitment of resources are provided for flowlines and intra-facility gathering lines [See Oil Spill Contingency Plan and Checklist in Attachment 2 and Inspection Log and Schedule in Attachment 3.1] [§112.9(d)(3)] or Appropriate secondary containment and/or diversionary structures or equipment is provided for flowlines and intra-facility gathering lines to prevent a discharge to navigable waters or adjoining shorelines. The entire secondary containment system, including walls and floor, is capable of containing oil and is constructed so that any discharge from the pipe, will not escape the containment system before cleanup occurs.	<input type="checkbox"/>	<input type="checkbox"/>
A flowline/intra-facility gathering line maintenance program to prevent discharges from each flowline has been established at this facility. The maintenance program addresses each of the following: <ul style="list-style-type: none"> • Flowlines and intra-facility gathering lines and associated valves and equipment are compatible with the type of production fluids, their potential corrosivity, volume, and pressure, and other conditions expected in the operational environment; • Flowlines, intra-facility gathering lines and associated appurtenances are visually inspected and/or tested on a periodic and regular schedule for leaks, oil discharges, corrosion, or other conditions that could lead to a discharge as described in §112.1(b). The frequency and type of testing allows for the implementation of a contingency plan as described under part 109 of this chapter. • Corrective action and repairs to any flowlines and intra-facility gathering lines and associated appurtenances as indicated by regularly scheduled visual inspections, tests, or evidence of a discharge. • Accumulations of oil discharges associated with flowlines, intra-facility gathering lines, and associated appurtenances are promptly removed. [§112.9(d)(4)] 	<input type="checkbox"/>	<input type="checkbox"/>
The following is a description of the flowline/intra-facility gathering line maintenance program implemented at this facility:		

C. Onshore Oil Drilling and Workover Facilities (§112.10(b), (c) and (d)):

The owner or operator must meet the general rule requirements as well as the requirements under this section.

Table G-12 General Rule Requirements for Onshore Oil Drilling and Workover Facilities	
Mobile drilling or worker equipment is positioned or located to prevent discharge as described in §112.1(b). [§112.10(b)]	<input type="checkbox"/>
Catchment basins or diversion structures are provided to intercept and contain discharges of fuel, crude oil, or oily drilling fluids. [§112.10(c)]	<input type="checkbox"/>
A blowout prevention (BOP) assembly and well control system was installed before drilling below any casing string or during workover operations. [§112.10(d)]	<input type="checkbox"/>
The BOP assembly and well control system is capable of controlling any well-head pressure that may be encountered while the BOP assembly and well control system are on the well. [§112.10(d)]	<input type="checkbox"/>

ATTACHMENT 2 – Oil Spill Contingency Plan and Checklist

An oil spill contingency plan and written commitment of resources is required for:

- Flowlines and intra-facility gathering lines at oil production facilities and
- Qualified oil-filled operational equipment which has no secondary containment.

An oil spill contingency plan meeting the provisions of 40 CFR part 109, as described below, and a written commitment of manpower, equipment and materials required to expeditiously control and remove any quantity of oil discharged that may be harmful is attached to this Plan.	<input type="checkbox"/>
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Complete the checklist below to verify that the necessary operations outlined in 40 CFR part 109 - Criteria for State, Local and Regional Oil Removal Contingency Plans - have been included.

Table G-15 Checklist of Development and Implementation Criteria for State, Local and Regional Oil Removal Contingency Plans (§109.5)^a

(a) Definition of the authorities, responsibilities and duties of all persons, organizations or agencies which are to be involved in planning or directing oil removal operations.	<input type="checkbox"/>
(b) Establishment of notification procedures for the purpose of early detection and timely notification of an oil discharge including: <ul style="list-style-type: none"> (1) The identification of critical water use areas to facilitate the reporting of and response to oil discharges. (2) A current list of names, telephone numbers and addresses of the responsible persons (with alternates) and organizations to be notified when an oil discharge is discovered. (3) Provisions for access to a reliable communications system for timely notification of an oil discharge, and the capability of interconnection with the communications systems established under related oil removal contingency plans, particularly State and National plans (e.g., NCP). (4) An established, prearranged procedure for requesting assistance during a major disaster or when the situation exceeds the response capability of the State, local or regional authority. 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
(c) Provisions to assure that full resource capability is known and can be committed during an oil discharge situation including: <ul style="list-style-type: none"> (1) The identification and inventory of applicable equipment, materials and supplies which are available locally and regionally. (2) An estimate of the equipment, materials and supplies which would be required to remove the maximum oil discharge to be anticipated. (3) Development of agreements and arrangements in advance of an oil discharge for the acquisition of equipment, materials and supplies to be used in responding to such a discharge. 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
(d) Provisions for well defined and specific actions to be taken after discovery and notification of an oil discharge including: <ul style="list-style-type: none"> (1) Specification of an oil discharge response operating team consisting of trained, prepared and available operating personnel. (2) Predesignation of a properly qualified oil discharge response coordinator who is charged with the responsibility and delegated commensurate authority for directing and coordinating response operations and who knows how to request assistance from Federal authorities operating under existing national and regional contingency plans. (3) A preplanned location for an oil discharge response operations center and a reliable communications system for directing the coordinated overall response operations. (4) Provisions for varying degrees of response effort depending on the severity of the oil discharge. (5) Specification of the order of priority in which the various water uses are to be protected where more than one water use may be adversely affected as a result of an oil discharge and where response operations may not be adequate to protect all uses. (6) Specific and well defined procedures to facilitate recovery of damages and enforcement measures as provided for by State and local statutes and ordinances. 	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

^a The contingency plan must be consistent with all applicable state and local plans, Area Contingency Plans, and the National Contingency Plan (NCP)

ATTACHMENT 3 – Inspections, Dike Drainage and Personnel Training Logs

ATTACHMENT 3.1 – Inspection Log and Schedule

Table G-16 Inspection Log and Schedule
 This log is intended to document compliance with §§112.6(a)(3)(iii), 112.8(c)(6), 112.8(d)(4), 112.9(b)(2), 112.9(c)(3), 112.9(d)(1), 112.9(d)(4), 112.12.(c)(6), and 112.12(d)(4), as applicable.

Date of Inspection	Container / Piping / Equipment	Describe Scope (or cite Industry Standard)	Observations	Name/ Signature of Inspector	Records maintained separately ^a
					<input type="checkbox"/>
					<input type="checkbox"/>
					<input type="checkbox"/>
					<input type="checkbox"/>
					<input type="checkbox"/>

^a Indicate in the table above if records of facility inspections are maintained separately at this facility.

ATTACHMENT 3.2 – Bulk Storage Container Inspection Schedule – onshore facilities (excluding production):

To comply with integrity inspection requirement for bulk storage containers, inspect/test each shop-built aboveground bulk storage container on a regular schedule in accordance with a recognized container inspection standard based on the minimum requirements in the following table.

Table G-17 Bulk Storage Container Inspection Schedule	
Container Size and Design Specification	Inspection requirement
Portable containers (including drums, totes, and intermodal bulk containers (IBC))	Visually inspect monthly for signs of deterioration, discharges or accumulation of oil inside diked areas
55 to 1,100 gallons with sized secondary containment	Visually inspect monthly for signs of deterioration, discharges or accumulation of oil inside diked areas plus any annual inspection elements per industry inspection standards
1,101 to 5,000 gallons with sized secondary containment and a means of leak detection ^a	
1,101 to 5,000 gallons with sized secondary containment and no method of leak detection ^a	Visually inspect monthly for signs of deterioration, discharges or accumulation of oil inside diked areas, plus any annual inspection elements and other specific integrity tests that may be required per industry inspection standards

^a Examples of leak detection include, but are not limited to, double-walled tanks and elevated containers where a leak can be visually identified.

ATTACHMENT 3.3 – Dike Drainage Log

Table G-18 Dike Drainage Log

Date	Bypass valve sealed closed	Rainwater inspected to be sure no oil (or sheen) is visible	Open bypass valve and reseal it following drainage	Drainage activity supervised	Observations	Signature of Inspector
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

ATTACHMENT 3.4 – Oil-handling Personnel Training and Briefing Log

Table G-19 Oil-Handling Personnel Training and Briefing Log

Date	Description / Scope	Attendees

ATTACHMENT 4 – Discharge Notification Form

In the event of a discharge of oil to navigable waters or adjoining shorelines, the following information will be provided to the National Response Center [also see the notification information provided in Section 7 of the Plan]:

Table G-20 Information provided to the National Response Center in the Event of a Discharge			
Discharge/Discovery Date		Time	
Facility Name			
Facility Location (Address/Lat-Long/Section Township Range)			
Name of reporting individual		Telephone #	
Type of material discharged		Estimated total quantity discharged	Gallons/Barrels
Source of the discharge		Media affected	<input type="checkbox"/> Soil
			<input type="checkbox"/> Water (specify)
			<input type="checkbox"/> Other (specify)
Actions taken			
Damage or injuries	<input type="checkbox"/> No <input type="checkbox"/> Yes (specify)	Evacuation needed?	<input type="checkbox"/> No <input type="checkbox"/> Yes (specify)
Organizations and individuals contacted	<input type="checkbox"/> National Response Center 800-424-8802 Time		
	<input type="checkbox"/> Cleanup contractor (Specify) Time		
	<input type="checkbox"/> Facility personnel (Specify) Time		
	<input type="checkbox"/> State Agency (Specify) Time		
	<input type="checkbox"/> Other (Specify) Time		