

## **Guidelines for the installation of BESS**

The following guidelines for the installation of BESS and sample SLD for such installation is approved as per recommendations of the internal standard advice committee of the department of Electrical Inspectorate, Government of Kerala.

<b>I Maximum capacity of BESS to be installed in each location</b>					
	A	Inside the building			Maximum capacity
	1	One- and Two-Family Dwellings and Townhouse Units	Single phase consumer	3kW,10kWh	
			Three phase consumer	5kW,15kWh	
	2	Non-Dedicated Building single occupancy	Single phase consumer	3kW,10kWh	
			Three phase consumer	5kW,15kWh	
			HT consumer	50 kWh	
	3	Non-Dedicated Building for common connection			25 kWh
	4	Dedicated room in ground floor of a building			100 kWh
	5	Building having height more than 15 m (for common connection)			50 kWh
	6	Dedicated/ Utility Building for BESS at Ground level			250 kWh
	B	Roof top of building			250 kWh
	C	On outside the wall at ground level of any building			30 kWh
	D	Open Garage			250 kWh
	E	Outdoor Isolated Installations			No limit
<b>II Conditions to be ensured when installed inside a building</b>					
	1	Not to be installed in living area or in sleeping units in family dwellings other than within utility closets and storage or utility spaces.			
	2	Suitable exhaust fan shall be provided for adequate ventilation.			
	3	BESS shall be installed in a separate room at ground level of the building which is having height more than 15 m irrespective of the capacity.			
	4	BESS shall not be installed other than the ground floor			
	5	It shall be installed at the periphery of the building with exhaust to outside the building.			
	6	It shall not be located within 15m of air inlets for building HVAC systems. When approved by a competent authority, this distance is permitted to be reduced to 7.5m if the automatic fire alarm system monitoring the radiant energy sensing detectors de-energizes the ventilation system connected to the air intakes upon detection of fire			

	7	Rooms or spaces containing BESS of 50 kWh and above shall be separated from other areas of the building by fire barriers with a minimum 2-hour fire resistance rating and horizontal assemblies with a minimum 2-hour fire resistance rating, provided there should be a clear distance of 8m with the nearby building.
<b>III Conditions to be ensured when installed in open Garage</b>		
	1	BESS shall be separated from any means of exit not less than 3m or required by the fire department to ensure safe evacuation under fire conditions
<b>IV</b>	2	BESS shall not be located within 7.5m of exits leading from the attached building when located on a covered level of the parking structure not directly open to the sky above.
	3	BESS shall be installed by maintaining a minimum distance of 3.5m from the fire service access point on the rooftop
	4	BESS shall be installed by maintaining a minimum distance of 3 m inside to the plot boundary
	5	Public way, parking area and driveway shall maintain a minimum distance of 3m from the BESS
	6	Areas within 3m on each side of ESS shall be cleared of combustible vegetation and other combustible growth. Single specimens of trees, shrubbery, or cultivated ground cover such as green grass, ivy, succulents, or similar plants used as ground covers shall be exempted, as they do not form a means of readily transmitting fire
	7	Vehicle impact protection consisting of guard posts or other approved means shall be provided where ESS are subject to impact by motor vehicles
	<b>Conditions to be ensured when installed in Dedicated Buildings</b>	
	1	It shall be constructed in accordance with local building codes
	2	Such building shall only be used for energy storage, energy generation, and other electrical grid-related operations.
	3	The access to the building containing ESS shall be restricted to authorised personnel
	4	An approved automatic smoke detection system shall be provided in the ESS areas. Same shall be combined with the smoke, ventilation and fire protection system of the building, if applicable.
	5	Minimum two doors of width 1.5m and opening outwards shall be provided for the building
	6	Exhaust outlets from BESS shall be located at least 4.5m from heating, ventilating and air conditioning (HVAC) air intakes, windows, doors, loading docks, ignition sources, and other openings into buildings and facilities
	7	Doors or accesses shall be provided with approved signs. Also, signs shall be provided within battery cabinets to indicate the relevant electrical, chemical, and fire hazard.
<b>Conditions to be ensured for Outdoor Isolated Installations</b>		

V	1	Battery containers in a BESS installation of 500 kWh and above shall have at least 30m distance from any other occupied buildings, public ways or storing spaces of combustible materials, excluding the ones associated with the BESS installation itself and the connecting HV/MV substation.
	2	The size of outdoor walk-in containers or enclosures housing shall not exceed 16.2 m × 2.6 m × 2.9 m, excluding HVAC and other equipment.
	3	External fire hydrant system and ordinary and flammable smoke detection systems shall be provided.
	4	Deflagration venting or adequate mechanical ventilation shall be provided
	5	External LPS shall be provided covering the entire BESS station.
	6	BESS installation yard shall be independent from the connecting HV/MV substation, connecting them to transmission system, although they can be installed on adjacent areas.
	7	In case of adjacent areas, there shall be a separating fence/ fire partition in between the BESS and substation yard. Also independent entries shall be provided for each yard.
	8	The AC and DC auxiliary power needed for BESS installation shall be independent from the auxiliary power of the connecting substation. No common low voltage bus bars, transformers or chargers are allowed.
	9	Electrical disconnecting switches shall be available at both sides of transformers and PCS units, providing safety during maintenance.
	10	The earthing system of both stations shall be interconnected, if the resistance area of the earthing system overlaps.
	11	Insulation monitor system shall be provided on the inverter output circuit to transformer, if unearthed.
	12	BESS will be able to provide/absorb maximum export/import active power at Point of Commencement of supply, at outdoor temperature range between - 10°C and 45°C. If ambient temperature is beyond the above limit other suitable measures such as roofing may be considered.
	13	During standby operating mode BESS shall be able to receive and deliver maximum import and export power at point of commencement of supply, as the case may be, without any intentional delay.
	14	Operations of maintenance, emergency response and fire response manuals shall be available in the control room.
	15	There shall be a minimum opening/ clearance of 3m door opening side of each container and 1m on the other side when installed side by side.
	16	Around the complete containers but inside of the BESS station fence, an access road of at least 5m width shall be provided for the access of fire-fighting vehicles and cranes for easy installation. At least one side of each container shall face to the 5m width road. The 5m roads of BESS installation shall be used as escape routes also and they shall have emergency lighting.

17	Areas within 3m on each side of outdoor BESS shall be cleared of combustible vegetation and other combustible growth. Single specimens of trees, shrubbery, or cultivated ground cover such as green grass, ivy, succulents, or similar plants used as ground covers shall be exempted, as they do not form a means of readily transmitting fire
18	Public way, parking area and driveway shall maintain minimum distance of 3m from the boundary of the road. If installed on road curves, it shall be ensured that it will not obstruct the vision of the driver.
19	Auxiliary transformer capacity shall be selected by considering the operation of fire pump system.
20	Sign board showing the type of technology, special hazards, type of suppression system installed, emergency contact information etc shall be exhibited on each container and near to the entrance to the BESS station.
21	Fencing up to a height of 1.8m with an all-round clearance of 3 m from the outer enclosure of the ESS with a lockable gate or shall be provided
<b>VI</b>	<b>Conditions to be ensured when installed at roof top of a building</b>
1	BESS shall be installed at the periphery of the building. There should be clear stairway access to the roof for emergency response and fire department personnel through a bulkhead from the interior of the building or a stairway on the exterior of the building and the minimum stairway width shall be 1.5m. A suitable guards/handrail shall be provided at the edge of the roof top.
2	BESS shall be located on roof top of a building having height more than 15m above subject to the prior approval of fire departments.
3	The BESS shall be installed by maintaining a minimum distance of 3.5m from the fire service access point on the rooftop
4	Installations shall be permitted that do not obstruct fire department rooftop operations
5	If there is roof top parking driveway such area shall maintain minimum 5m clearance from the ESS
6	BESS and associated equipment shall be located from the edge of the roof at a distance equal to at least the height of the container, equipment, or component subject to a minimum distance of 1.5m
7	The roofing materials under and within 1.5m horizontally from an ESS or associated equipment shall be non-combustible.
8	At least one number Class I standpipe outlet shall be installed at an approved location on the roof level of the building or in the stairway bulkhead at the top level.
9	In buildings with centralised AC system, it shall be ensured that the air in the ESS room shall not mix with the AHU of the building. Exhaust outlet from an ESS shall not be directed onto air inlet of AC unit and the exhaust contains anything other than ventilation air, it shall be located at least 4.5m away.
<b>VII</b>	<b>Container Safety</b>

1	All air ingress openings of all containers shall have dust filters installed
2	Containers shall be constructed so that no debris, shrapnel or pressure waves are ejected in case of a battery module explosion. Suitable deflagration pressure reliefs valves/vents shall be provided and same shall not being directed towards walkways and roads.
3	Each Li-ion battery module shall incorporate a pressure relief, preventing explosion. The battery module type shall pass the mechanical, electrical and thermal "reasonably foreseeable misuse" tests, as well the other safety tests foreseen in IEC 62619 and IEC 63056 or equivalent UL/IEEE standards.
4	The battery racks type shall pass the safety tests foreseen in IEC 63056 or equivalent UL/IEEE standards, including reverse connection of a module on it during erection (if modules are erected on site).
5	Each battery container shall have a central power disconnecting switch, installed near the access door. Each battery rack shall also have a power disconnecting switch, installed on the rack. The switches shall be electrically and manually operated. Auxiliary power shall not be disconnected through these switches.
6	BMS shall continuously monitor the temperature, voltage and current of each module and shall ensure that the permissible safe limits are not crossed during charging and discharging. If any of the parameters of any of the module in a container crosses the permissible limits, the BMS shall isolate the entire battery container housing the affected module through tripping of the container switch.
7	In case of mal-operation of above mentioned BMS monitoring and protection functions, the affected container shall be isolated through tripping of its power switch. Same will happen in case of fire alarm energization in the container.
8	All containers, including all transformers, shall have automatic fire alarm and fire suppression system. Automatic energization of fire suppression system by fire alarm shall be applied
9	In battery containers, fire alarm system shall include off-gas detectors and signals from BMS. Off-gas detectors shall be sensitive to some or all of the gases released from Li-ion modules under thermal runaway.
10	Activation of both overheating alarm from BMS and of an off-gas detector shall be necessary for energization of fire suppression system. Energization of fire
	suppression system shall follow an evacuation time, in case of walk-in containers.
11	An external fire alarm beacon shall be installed on each battery container. Audible alarm shall be also available in BESS installation.
12	Fire suppression system shall be of water sprinkler type, suitable for electrical fires. The fire-fighting water density shall be at least 12.2 mm/min, meaning at least 12.2 lt/min per each m2 of container area
13	Alternatively, an aerosol or gas flooding agent fire suppression system can be installed in the battery containers. Before energization of the system, all access doors and openings shall

		automatically close and the ventilation stopped, allowing egress of air only through pressure reliefs.
	14	After fire extinguishing, access doors and openings will remain locked, until flooding agent and smoke is removed through manual energization of ventilation. The manual ventilation energization point shall be located remotely from the battery containers and marked accordingly.
	15	Before BESS installation, the owner shall submit to the local Fire Agency office the appropriate fire response manual from BESS manufacturer. Also the following information shall be submitted: location of BESS on map with coordinates, battery technology (Lion), guaranteed energy capacity of BESS, number of battery containers and the energy capacity of each, number of battery modules in each container and the energy capacity of each module, SDS of all hazardous material, description of the fire-alarm and the fire-suppression system, including the type of fire-suppression media used, permanent water supply connection or alternatively, the reasons why permanent water supply connection is not possible and the volume of local water tank, layout drawing of BESS installation, depicting the location of battery containers and their access doors, fire resistance rating of container walls, the roads for fire-fighting vehicles access, the locations of firefighting hydrants and of the water tank
<b>VIII BESS with Islanded operation</b>		
	1	A four pole Source Isolation Switch (SIS), PLC or other suitable arrangement for interfacing BESS shall be provided immediately after the Point of Commencement of supply or at the incomer of the panel to which BESS is to be connected.
	2	Adequate provision with lockable facility for isolation, switching and protection shall be provided immediately after the BESS unit.
	3	Neutral earthing with switching operation using additional contactor shall be provided during island operation. It shall be ensured that the earthing contactor hold only in islanding operation and it makes before and breaks after the action of the main switching contactor inside the BESS
	4	Low set earth fault relay using CT in neutral earthing path shall be provided for BESS with capacity 100kW and above.
	5	Fault loop impedance shall be measured and ensured within limit to operate protective device. If fault loop impedance is beyond the limit RCD protection shall be provided.
	6	Emergency supply isolation facility from BESS (using push button) shall be provided at a conspicuous location in ground floor and it shall be suitably identified.
<b>IX Connectivity with Grid</b>		
	1	The total KW rating of the ESS at consumer premises shall be limited to 50% of the transformer capacity. If the transformer with OLTC is used it can be up to 80%.
	2	Voltage level of connectivity shall be according to the Kerala Electricity Supply Code and shall be permitted up to 33kV
	3	Adequate rated lockable isolator shall be provided after the point of commencement of supply.

	4	Test certificates for ant islanding and harmonics shall be made available.
	5	Bi-directional energy meters shall be provided at the Point of commencement of supply and in the BESS feeder.
	6	Technical feasibility from the supplier shall be obtained before the start of the installation.
	7	It is recommended to operate the prosumer's installation to a power factor equal or exceeding a present threshold of 0.85.
	8	The total KW rating of the BESS at consumer premises shall be limited in accordance with Regulation 13 of Kerala State Electricity Regulatory Commission (Renewable Energy and Net Metering) Regulations 2020 or its amendment.
	9	Normally BESS at consumer premises shall be operated in beyond the meter mode till Regulatory Commission issues necessary orders for power exporting.
<b>X</b>	<b>General conditions</b>	
	1	Adequate rated switchgear for isolation, switching and protection shall be provided immediately after the BESS container.
	2	All-round clearance of 1 m shall be provided for BESS container, provided adequate clearance on the side of door opening.
	3	An approved automatic smoke detection system shall be provided in the ESS areas. Same shall be combined with the smoke and fire protection system of the building, if applicable.
	4	BESS shall not be installed in common utility or service area specified by the local authority
	5	Exhaust outlet from an BESS shall not be directed onto means of egress, walkways, or pedestrian or vehicular travel paths
	6	In buildings with centralised AC system, it shall be ensured that the air in the ESS room shall not mix with the AHU of the building. Exhaust outlet from an ESS shall not be directed onto air inlet of AC unit and the exhaust contains anything other than ventilation air, it shall be located at least 4.5m away.
	7	BESS shall not be located within 15m of air inlets for building HVAC systems. When approved by a competent authority, this distance is permitted to be reduced to 7.5m if the automatic fire alarm system monitoring the radiant energy sensing detectors de-energizes the ventilation system connected to the air intakes upon detection of fire
	8	BESS shall be secured against unauthorized entry and safeguarded in an approved manner.
	9	BESS shall not be located inside an electrical room and shall be accessible to emergency responders without traversing through an electrical room.
	10	Door of the ESS room shall open outwards. Doors or accesses into the following shall be provided with approved signs. Also, signs shall be provided within battery cabinets to indicate the relevant electrical, chemical, and fire hazard. Model of sign board given below.
	11	No combustible/hazardous material shall be stored within 3m from the BESS

12	Only three phase units shall be used in three phase installation
13	Proper barricade shall be provided for BESS container to prevent easy access where installed in unrestricted area.
14	Self-certification or certificate from a competent agency, regarding the adequacy of inbuilt fire protection and ventilation requirement shall be forwarded.
15	No separate BESS shall be permitted to individual consumers of a building
16	Amendment of this guideline shall be done as per the recommendations of the Internal Standard Advice Committee of the department.

**Date: 18/03/2025**

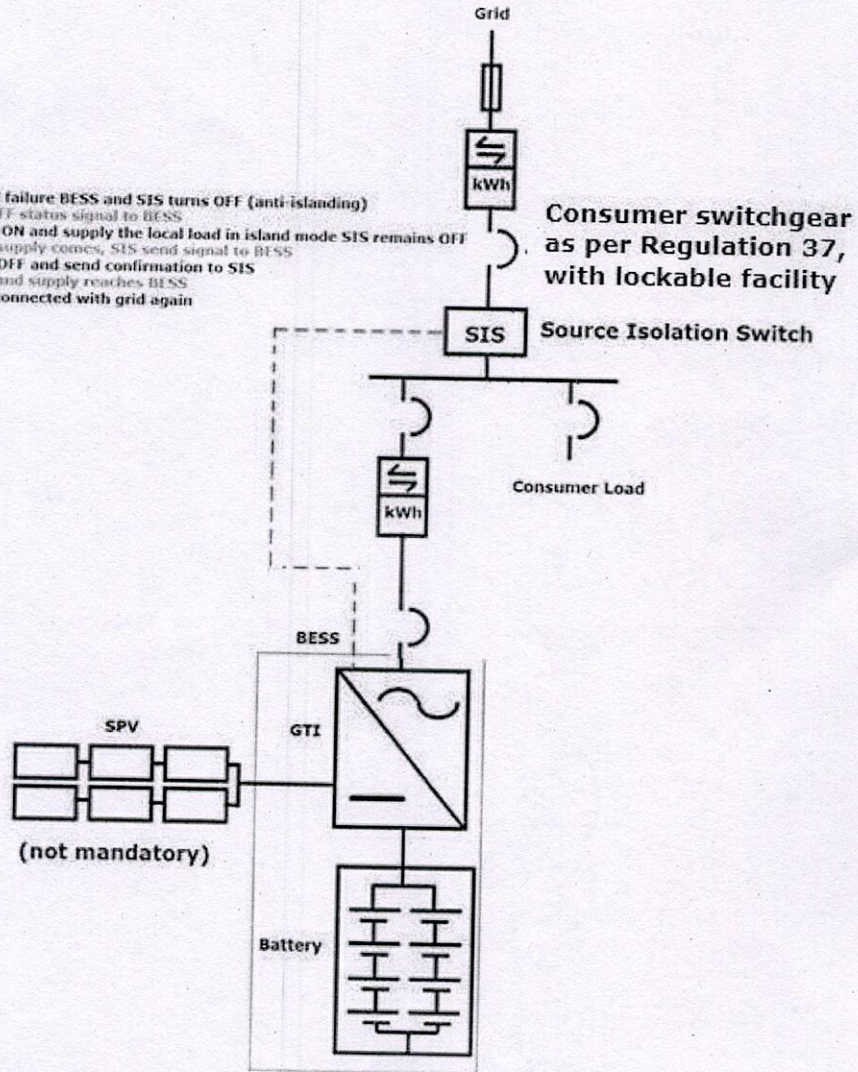
  
**Chief Electrical Inspector**



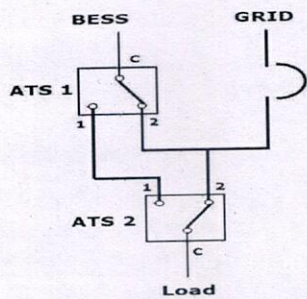
## APPENDIX – Single line diagram BESS installation

**Note**

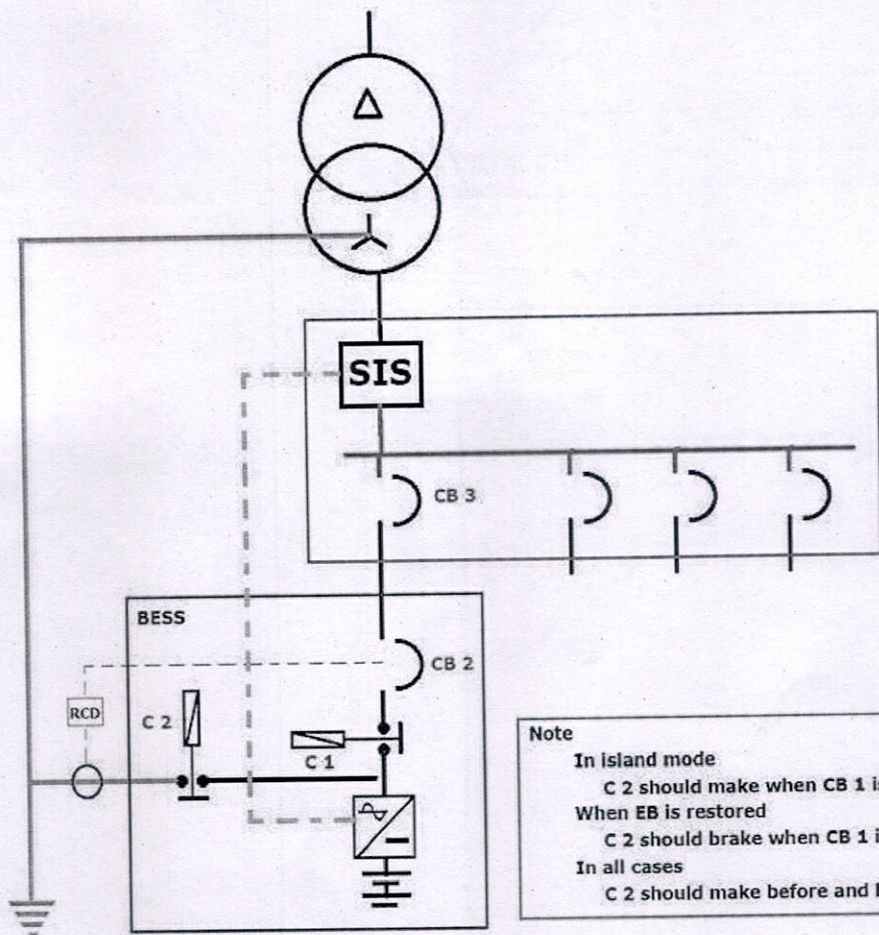
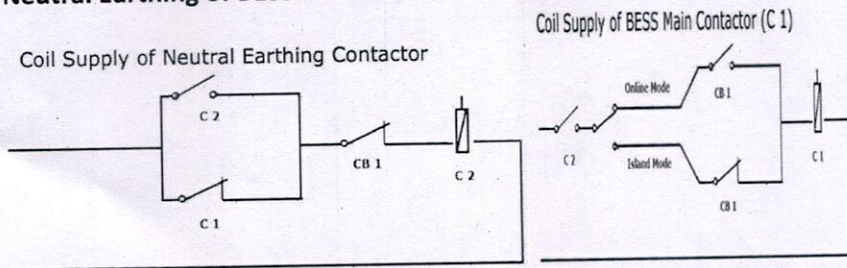
1. During grid failure BESS and SIS turns OFF (anti-islanding)
2. SIS send OFF status signal to BESS
3. BESS turns ON and supply the local load in island mode SIS remains OFF
4. When grid supply comes, SIS send signal to BESS
5. BESS goes OFF and send confirmation to SIS
6. SIS closes and supply reaches BESS
7. BESS gets connected with grid again



In place of SIS following arrangement can be used



**Neutral Earthing of BESS in island**



**Note**  
 In island mode  
 C 2 should make when CB 1 is OPEN  
 When EB is restored  
 C 2 should brake when CB 1 is CLOSE  
 In all cases  
 C 2 should make before and brake after C 1