

Summary of BHEL reply to Technical prebid queries

Bidder Query

In reference to subjected tender, for EDN requirements for mandatory spares is mentioned as "2 no's for each rating and type"

Please confirm the below

1. whether we have to consider "2 No's of each type and rating" for every set or " 2 No's of each type and rating" for total quantity of particular location.

2. If Multiple strings have to be supplied for each quantity, we understand no of strings shall be multiplied with 2 cells for calculating the total no of spare cells.

BHEL reply

1. As per specification, 2 nos of each type and rating have to be provided for each location irrespective of no. of battery banks.

2. Vendor understanding is correct.

DC BATTERY HEALTH MONITORING SYSTEM (BHMS)	Bidder Remarks	BHEL Reply Remarks
DC Battery Health Monitoring System shall include microprocessor-based hardware and software to monitor the condition of each battery cell of 220V DC systems battery banks on-line on 24x7 basis. With DC Health Monitoring System, it shall be possible to measure & analyse the individual cell and battery parameters so that any damage to battery shall be prevented by proactive maintenance. Each Battery set of main plant battery (unit#1 and unit#2) shall have its own independent DC Health Monitoring System. Separate OWS for Unit#1 & Unit#2 shall be provided. They (OWS) shall be located in Main plant control room.	Bidder offers a microprocessor based BMS (Battery monitoring system). Kindly provide the SLD & room layout drawings for unit#1 & unit#2 for our references.	Bidder to follow specification. The BHMS (Battery Health Monitoring System) design shall be entirely the responsibility of the bidder/vendor. BHEL has specified only the required functional outputs and performance requirements. Layout drawing will be furnished during detailed engineering of each project.
DC Health Monitoring System shall measure and store the following parameters at predetermined time interval as decided by the owner during detail engineering: a) Each Cell Voltage b) Battery DC Current c) Ambient and Cell temperature	Individual cell voltage & battery charge/discharge current can be measured. Bidder shall provide one ambient temperature sensor for complete battery bank monitoring, and one temperature sensor per CSU unit for monitoring cell temperature.	Same shall be decided during detailed engineering.
Cable Requirement for DC-HMS: In addition to all the accessories required for meeting the above requirement of DC-Health monitoring system, Suitable length & type of Cables required to establish connection between cells to HMS and HMS to DDCMIS, should be considered by bidder in their scope of supply. Distance of 100 m for Unit#1, & 100 m for Unit#2; is to be considered between Battery room and DDCMIS.	Type of cables, lengths, accessories, internal wiring in MCU & Display considered as per bidder standard. Teflon cables shall be used for Cells to CSU, CAT5 communication cable is considered for 100 m distance between the BMS (MCU) and DDCMIS for both Unit#1 & Unit2. MCU to Display unit distance shall be <5 mtrs.	Follow specification
For completeness of BHMS all Cable including special Cable, Cable Trays (PVC) shall be in bidder scope, bidder to supply the complete Qty. for commissioning of the BHMS. Suitable shunt box shall also be supplied by bidder per the cable size. Glass tube fuse to be included by bidder in between each cell and BHMS. BHMS panel is kept @ 8.5 M El. and converter is kept at 17m Elv.	CSU, MCU shall be rack mounted on the battery rack, and display unit will be on wall mounted. Bidder shall provide cable truffs for routing cells to CSU instead of trays.	noted
01 (one no.) of Industrial grade PC shall be supplied with each unit as a HMI for BHMS. The PC shall have all latest software and hardware to monitor the parameters of Battery and can take print of the same.	Each BMS system have HMI display unit for monitoring battery parameters. Note, Bidder considered one PC/laptop per unit as per the project requirement	noted
Also, kindly note that the various material along with correct BoQ required for complete commissioning of BHMS is in bidder's scope. Some of the items are as listed below like: PVC Cable Tray with fixing screw & tray cover Copper Wire from battery to BHMS panel Special cable from BHMS panel to converter Special cable from converter to PC BHMS system PC Shunt box (with suitable arrangement for incoming cable) Glass fuse tubes The above listed items are tentative in nature and various material along with correct BoQ required for complete commissioning of BHMS is in bidder's scope. Kindly note that the tentative distance between BHMS panel to converter is 150m.	Type of cables, lengths, accessories, internal wiring in MCU & Display considered as per Bidder standard. Teflon cables shall be used for Cells to CSU, CAT5 communication cable shall be provided between MCU to converters and between converter to PC/laptop. Note: MCU to Display unit distance shall be <5 mtrs. BHEL shall provide suitable provision for installation of shunt in the battery -ve path.	Same shall be decided during detailed engineering.
Bidder shall submit QAP for DC BATTERY HEALTH MONITORING SYSTEM (BHMS) during contract stage, for BHEL's approval	Bidder shall submit the QAP during the detailed engineering stage.	Noted
5% Spares for BHMS	Enclosed Annexure for 5% spares	The BHMS (Battery Health Monitoring System) design shall be entirely the responsibility of the bidder/vendor. BHEL has specified only the required functional outputs and performance requirements. The vendor shall prepare and submit the detailed drawings along with the Bill of Materials (BOM) for approval. The mandatory spares shall be 5% of the final approved BOM quantity, which shall be supplied as part of the scope of work without any techno commercial

ANNEXURE 4 OF SCOPE SUPPLY

Applicable only for Batteries of UPS																	
Sl No.	Battery for UPS/ Charger	UPS (kVA)	IE	Current Load + design margin	Project Name	Battery Bank Quantity (Sets)	Backup time (Min)	Min. Temp (°C)	Aging Factor for Ni-Cd	ECV for Ni-Cd	No. of cells per Battery bank for Ni-	Mandatory spares Specification, if applicable	Name of Unit	Remarks	Qty(Battery: Total AH (No. of cells*Battery model) No of Battery Bank)	Bidder remarks	BHEL REPLY
1	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec 1692 A - 1 min 662 A - 13 min 1779 A - 1 min 1109 A - 29 min 1121 A - 1 min.	SIPAT- Main plant Location	4	45	15	1.25	1.14	169	(a) Complete dry cell - 5% or 10 Nos. whichever is more for each set of battery bank (b) Inter-cell connectors with Hardware - 5% or 5 Nos. whichever is more for each set of battery bank	PEM			1. Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.
2	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	SIPAT- OFFSITE	2	45	15	1.25	1.14	169	(a) Complete dry cell - 5% or 10 Nos. whichever is more for each set of battery bank (b) Inter-cell connectors with Hardware - 5% or 5 Nos. whichever is more for each set of battery bank	PEM	Minimum size of battery – 150AH for Lead acid plant type / 90AH for Ni-Cd high discharge pocket plate type battery. The load cycle for all offsite batteries is attached. If the battery size calculated by the vendor is below 90Ah-Ni-Cd/150Ah-Plante, the vendor shall still provide a 90Ah-Ni-Cd/150Ah-Plante battery. However, if the calculated battery size exceeds 90Ah-Ni-Cd/150Ah-Plante, the vendor shall provide the battery as per the actual sizing requirement.		Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.
3	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec 1720 A - 1 min 665 A - 13 min 1786 A - 1 min 1115 A - 29 min 1153 A - 1 min.	Singrauli- Main plant Location	8	45	15	1.25	1.14	169	(a) Complete dry cell - 5% or 10 Nos. whichever is more for each set of battery bank (b) Inter-cell connectors with Hardware - 5% or 5 Nos. whichever is more for each set of battery bank	PEM			Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.
4	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Singrauli - OFFSITE	2	45	15	1.25	1.14	169	(a) Complete dry cell - 5% or 10 Nos. whichever is more for each set of battery bank (b) Inter-cell connectors with Hardware - 5% or 5 Nos. whichever is more for each set of battery bank	PEM	Minimum size of battery – 150AH for Lead acid plant type / 90AH for Ni-Cd high discharge pocket plate type battery. The load cycle for all offsite batteries is attached. If the battery size calculated by the vendor is below 90Ah-Ni-Cd/150Ah-Plante, the vendor shall still provide a 90Ah-Ni-Cd/150Ah-Plante battery. However, if the calculated battery size exceeds 90Ah-Ni-Cd/150Ah-Plante, the vendor shall provide the battery as per the actual sizing requirement.		Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.
5	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec 1610 A - 1 min 544 A - 13 min 1669 A - 1 min 994 A - 29 min 1007 A - 1 min.	Korba West - Main plant Location	8	45	15	1.25	1.14	169	(a) Complete dry cell - 5% or 10 Nos. whichever is more for each set of battery bank (b) Inter-cell connectors with Hardware - 5% or 5 Nos. whichever is more for each set of battery bank	PEM			Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.
6	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Korba west - OFFSITE	2	45	15	1.25	1.14	169	(a) Complete dry cell - 5% or 10 Nos. whichever is more for each set of battery bank (b) Inter-cell connectors with Hardware - 5% or 5 Nos. whichever is more for each set of battery bank	PEM	Minimum size of battery – 150AH for Lead acid plant type / 90AH for Ni-Cd high discharge pocket plate type battery. The load cycle for all offsite batteries is attached. If the battery size calculated by the vendor is below 90Ah-Ni-Cd/150Ah-Plante, the vendor shall still provide a 90Ah-Ni-Cd/150Ah-Plante battery. However, if the calculated battery size exceeds 90Ah-Ni-Cd/150Ah-Plante, the vendor shall provide the battery as per the actual sizing requirement.		Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.
7	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec 1735 A - 1 min 618 A - 13 min 1736 A - 1 min 1070 A - 104 min 1055 A - 1 min.	Yamunanagar-Main Plant Location	2	120	5	1.25	1.14	169	1) Battery cell against battery bank installed at various locations - 10 nos. 2) Empty cell container of each type - 10 nos. 3) Level indicator - 6 nos. 4) Vent Plugs - 12 nos. 5) Inter-cell connector with hardware - 5% or 5 Nos. whichever is more for each set of battery bank. 6) Nuts, Bolts and Washer - 12 sets	PEM			Please confirm the load cycle to be considered. In Mandatory spares Battery dry cells of 10 no's and also empty containers of 10 no's are mentioned. Please confirm. Level indicator is not applicable for Nickel cadmium batteries	1.Refer attachment specification extract with Unit, Project and location scope details. Quote as per specification 2.Quote as per specification 3. Noted for indicator.
8	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec 1704 A - 1 min 618 A - 13 min 1735 A - 1 min 1065 A - 29 min 1077 A - 1 min.	Daripali - Main Plant Location	2	45	15	1.25	1.14	169	(a) Complete dry cell - 5% or 10 Nos. whichever is more for each set of battery bank (b) Inter-cell connectors with Hardware - 5% or 5 Nos. whichever is more for each set of battery bank	PEM			Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.
9	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Daripali - Water System Area	2	45	15	1.25	1.14	169	(a) Complete dry cell - 5% or 10 Nos. whichever is more for each set of battery bank (b) Inter-cell connectors with Hardware - 5% or 5 Nos. whichever is more for each set of battery bank	PEM	Minimum size of battery – 150AH for Lead acid plant type / 90AH for Ni-Cd high discharge pocket plate type battery. The load cycle for all offsite batteries is attached. If the battery size calculated by the vendor is below 90Ah-Ni-Cd/150Ah-Plante, the vendor shall still provide a 90Ah-Ni-Cd/150Ah-Plante battery. However, if the calculated battery size exceeds 90Ah-Ni-Cd/150Ah-Plante, the vendor shall provide the battery as per the actual sizing requirement.		Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.
10	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Daripali - FOPH Area	2	45	15	1.25	1.14	169	(a) Complete dry cell - 5% or 10 Nos. whichever is more for each set of battery bank (b) Inter-cell connectors with Hardware - 5% or 5 Nos. whichever is more for each set of battery bank	PEM	Minimum size of battery – 150AH for Lead acid plant type / 90AH for Ni-Cd high discharge pocket plate type battery. The load cycle for all offsite batteries is attached. If the battery size calculated by the vendor is below 90Ah-Ni-Cd/150Ah-Plante, the vendor shall still provide a 90Ah-Ni-Cd/150Ah-Plante battery. However, if the calculated battery size exceeds 90Ah-Ni-Cd/150Ah-Plante, the vendor shall provide the battery as per the actual sizing requirement.		Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.
11	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Daripali - RWPH Area	2	45	15	1.25	1.14	169	(a) Complete dry cell - 5% or 10 Nos. whichever is more for each set of battery bank (b) Inter-cell connectors with Hardware - 5% or 5 Nos. whichever is more for each set of battery bank	PEM	Minimum size of battery – 150AH for Lead acid plant type / 90AH for Ni-Cd high discharge pocket plate type battery. The load cycle for all offsite batteries is attached. If the battery size calculated by the vendor is below 90Ah-Ni-Cd/150Ah-Plante, the vendor shall still provide a 90Ah-Ni-Cd/150Ah-Plante battery. However, if the calculated battery size exceeds 90Ah-Ni-Cd/150Ah-Plante, the vendor shall provide the battery as per the actual sizing requirement.		Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.
12	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec 1627 A - 1 min 605 A - 13 min 1723 A - 1 min 1052 A - 29 min 1055 A - 1 min.	Singreni - Main Plant area	2	45	15	1.25	1.14	169	i) Complete dry cell : 5 % or 5 no whichever is more for each set of battery bank. ii) Intercell connectors with hardware : 5% or 5 no. whichever is more for each set of battery bank	PEM			Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.
13	Battery for Charger	NA	NA	Refer ISG Load duty cycle in Spec	2X800MW Lara- CHP	2	60	15	1.25	1.14	169	a) Battery Cells-5% or 10 Nos. whichever is more for each set of battery bank b) Inter-cell connectors with Hardware-5% or 5 Nos. whichever is more for each set of battery bank	ISG	Please refer enclosed DBR for detailed Load cycle. Minimum battery rating of 90AH in case of Ni-Cd battery and 150Ah in case of Lead Acid battery or as per enclosed Load Cycle & Design Factors whichever is higher to be considered		Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.
14	Battery for Charger	NA	NA	Refer ISG Load duty cycle in Spec	2X800MW Lara- AHP	2	30	15	1.25	1.14	169	a) Battery Cells-5% or 10 Nos. whichever is more for each set of battery bank b) Inter-cell connectors with Hardware-5% or 5 Nos. whichever is more for each set of battery bank	ISG	Please refer enclosed DBR for detailed Load cycle. Minimum battery rating of 90AH in case of Ni-Cd battery and 150Ah in case of Lead Acid battery or as per enclosed Load Cycle & Design Factors whichever is higher to be considered		Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.

15	Battery for Charger	NA	NA	Refer ISG Load duty cycle in Spec	2X800MW Singrauli-CHP-1	2	60	15	1.25	1.14	169	a) Battery Cells-5% or 10 Nos. whichever is more for each set of battery bank b) Inter-cell connectors with Hardware-5% or 5 Nos. whichever is more for each set of battery bank	ISG	Please refer enclosed DBR for detailed Load cycle. Minimum battery rating of 90AH in case of Ni-Cd battery and 150AH in case of Lead Acid battery or as per enclosed Load Cycle & Design Factors whichever is higher to be considered		Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.
16	Battery for Charger	NA	NA	Refer ISG Load duty cycle in Spec	2X800MW Singrauli-CHP-2	2	60	15	1.25	1.14	169	a) Battery Cells-5% or 10 Nos. whichever is more for each set of battery bank b) Inter-cell connectors with Hardware-5% or 5 Nos. whichever is more for each set of battery bank	ISG	Please refer enclosed DBR for detailed Load cycle. Minimum battery rating of 90AH in case of Ni-Cd battery and 150AH in case of Lead Acid battery or as per enclosed Load Cycle & Design Factors whichever is higher to be considered		Please confirm the load cycle to be considered	Refer attachment specification extract with Unit, Project and location scope details.
17	SUPERVISION OF ERECTION - BATTERY-PEM Requirement												PEM/ISG		46		
18	COMMISSIONING OF BATTERY-PEM Requirement												PEM/ISG		46		
19	COMMISSIONING OF BHMS-PEM Requirement												PEM/ISG		46		
20	BHMS-PEM Requirement											(c) BHMS Spares- 5% of installed capacity	PEM/ISG		46		
21	Additional accessories per battery bank for ISG Banks												ISG	Additionally The battery set shall include the following items:- 1. Electrolyte (for first filling plus 10% extra in non-returnable container) 2. MS racks properly treated with alkali resistance powder 3. Stand insulators plus 5% extra 4. Inter-cell, inter row, inter bank connectors with connection hardware as required for complete installation plus 5% extra and end take-off with one no. extra take off. 5. Cell numbering tags with fixing arrangement 6. Anti-splash type vent plug 7. Nickel coated connection hardware plus 5% extra 8. Cable clamps with fixing hardware 9. PVC/ CFRP spill trays under battery set (battery to have spill tray covering every cell)	8	As per Spec the battery Prices shall include batteries, Stand, electrolyte and connectors, However N additional accessories per battery bank/ or ISG the above items are mentioned once again. The Qty of the Electrolyte is 10% additional, where is the spec calls for 5% additional electrolyte. What is the exact qty of extra electrolyte to be supplied. The Battery bank load profile is not same for all 8 qty, hence additional accessories items price cannot be uniform .	1.For ISG requirement alone, price of electrolyte, stand and other accessories as per remarks, shall be offered in this line item. Dry cell price to be offered against batteries line item. 2.If unit rate for accessories is not uniform for each battery bank, separate price of accessories shall be provided for each battery bank.
22	Battery for Charger			220V 0-1" - 170.27A 1-60" - 53.11A 61"-180" - 48.10A	DVC Kodarma	2	180	15	1.25	1.14	183	a) Complete dry cell (1 Set = 5% or 10 Nos. whichever is more, for each set of Battery Bank) - 2 set b) Inter-cell connectors with Hardware (1 Set = 5% or 5 Nos. whichever is more for each set of Battery Bank) - 2 set	TBG	Minimum Rating: 220V Battery – 625 AH Lead Acid Plante / 480 AH Ni-Cd (KPH Type)		1.Whether 1 set of Mandatory spares have to be calculated for Each battery bank set. Our understanding is 5% of 183 cells works to 9.15 cells. Whether 10 cells or 20 cells have offered for each battery bank under mandatory spares. 2.As per clarification provided by EDN, for 220V Ni-Cd TBG application, H type battery is to be provided for all projects PIs confirm the same.	1. 1 set of spares to be considered for each set of battery bank. 1 set = 5% or 10 nos. whichever is more Hence, for 2 sets = 10% or 20 nos. whichever is more. 2. For 220V Ni-Cd TBG application, only KPH type battery is acceptable.
23	Battery for Charger			220V 0-1" - 210A 1-60" - 85A 61"-180" - 75A	CSPGCL Korba	2	180	15	1.25	1.14	183	a) Complete dry cell (1 Set = 5% or 10 Nos. whichever is more for each set of Battery Bank) - 2 set b) Inter-cell connectors with Hardware (1 Set = 5% or 5 Nos. whichever is more for each set of Battery Bank) - 2 set	TBG	Minimum Rating: 220V Battery – 625 AH Lead Acid Plante / 480 AH Ni-Cd (KPH Type) 48V Battery – 425 AH Lead Acid Plante / 390 AH Ni-Cd (KPL Type)		1.Whether 1 set of Mandatory spares have to be calculated for Each battery bank set. Our understanding is 5% of 183 cells works to 9.15 cells. Whether 10 cells or 20 cells have offered for each battery bank under mandatory spares. 2.As per clarification provided by EDN, for 220V Ni-Cd TBG application, H type battery is to be provided for all projects PIs confirm the same.	1. 1 set of spares to be considered for each set of battery bank. 1 set = 5% or 10 nos. whichever is more Hence, for 2 sets = 10% or 20 nos. whichever is more. 2. For 220V Ni-Cd TBG application, only KPH type battery is acceptable.
24	Battery for Charger			48V 0-180" - 65A	CSPGCL Korba	2	180	15	1.25	1.14	40	a) Complete dry cell (1 Set = 5% or 10 Nos. whichever is more for each set of Battery Bank) - 2 set b) Inter-cell connectors with Hardware (1 Set = 5% or 5 Nos. whichever is more for each set of Battery Bank) - 2 set	TBG	Minimum Rating: 220V Battery – 625 AH Lead Acid Plante / 480 AH Ni-Cd (KPH Type) 48V Battery – 425 AH Lead Acid Plante / 390 AH Ni-Cd (KPL Type)		1.Whether 1 set of Mandatory spares have to be calculated for Each battery bank set. Our understanding is 5% of 40 cells works to 2 cells. Whether 10 cells or 20 cells have offered for each battery bank under mandatory spares. 2.As per clarification provided by EDN, for 48V Ni-Cd TBG application, L type battery is to be provided for all projects PIs confirm the same.	1. 1 set of spares to be considered for each set of battery bank. 1 set = 5% or 10 nos. whichever is more Hence, for 2 sets = 10% or 20 nos. whichever is more. 2. For 48V Ni-Cd TBG application, only KPL type battery is acceptable.
25	Battery for Charger			220V 0-1" - 241A 1-60" - 100A 61"-180" - 82A	NTPC Singrauli	2	180	15	1.25	1.14	183	a) Complete dry cell (1 Set = 5% or 10 Nos. whichever is more for each set of Battery Bank) - 4 set b) Inter-cell connectors with Hardware (1 Set = 5% or 5 Nos. whichever is more for each set of Battery Bank) - 4 set	TBG	Minimum Rating: 220V Battery – 625 AH Lead Acid Plante / 480 AH Ni-Cd (KPH Type) 48V Battery – 425 AH Lead Acid Plante / 390 AH Ni-Cd (KPL Type)		1.Whether 1 set of Mandatory spares have to be calculated for Each battery bank set. Our understanding is 5% of 183 cells works to 9.15 cells. Whether 10 cells or 40 cells have offered for each battery bank under mandatory spares. 2.As per clarification provided by EDN, for 220V Ni-Cd TBG application, H type battery is to be provided for all projects PIs confirm the same.	1. 1 set of spares to be considered for each set of battery bank. 1 set = 5% or 10 nos. whichever is more Hence, for 2 sets = 10% or 20 nos. whichever is more. (4 set is corrected to 2 set) 2. For 220V Ni-Cd TBG application, only KPH type battery is acceptable.
26	Battery for Charger			48V 0-180" - 59A	NTPC Singrauli	2	180	15	1.25	1.14	40	a) Complete dry cell (1 Set = 5% or 10 Nos. whichever is more for each set of Battery Bank) - 4 set b) Inter-cell connectors with Hardware (1 Set = 5% or 5 Nos. whichever is more for each set of Battery Bank) - 4 set	TBG	Minimum Rating: 220V Battery – 625 AH Lead Acid Plante / 480 AH Ni-Cd (KPH Type) 48V Battery – 425 AH Lead Acid Plante / 390 AH Ni-Cd (KPL Type)		1.Whether 1 set of Mandatory spares have to be calculated for Each battery bank set. Our understanding is 5% of 40 cells works to 2 cells. Whether 10 cells or 40 cells have offered for each battery bank under mandatory spares. 2.As per clarification provided by EDN, for 48V Ni-Cd TBG application, L type battery is to be provided for all projects PIs confirm the same.	1. 1 set of spares to be considered for each set of battery bank. 1 set = 5% or 10 nos. whichever is more Hence, for 2 sets = 10% or 20 nos. whichever is more. (4 set is corrected to 2 set) 2. For 48V Ni-Cd TBG application, only KPL type battery is acceptable.
27	Battery for Charger			220V 0-1" - 185A 1-60" - 60A 61"-180" - 55A	SCCL Singreni	2	180	15	1.25	1.14	183	a) Complete dry cell (1 Set = 5% or 5 Nos. whichever is more for each set of Battery Bank) - 2 set b) Inter-cell connectors with Hardware (1 Set = 5% or 5 Nos. whichever is more for each set of Battery Bank) - 2 set	TBG	Minimum Rating: 220V Battery – 625 AH Lead Acid Plante / 480 AH Ni-Cd (KPH Type)		1.Whether 1 set of Mandatory spares have to be calculated for Each battery bank set. Our understanding is 5% of 183 cells works to 9.15 cells. Whether 10 cells or 20 cells have offered for each battery bank under mandatory spares. 2.As per clarification provided by EDN, for 220V Ni-Cd TBG application, H type battery is to be provided for all projects PIs confirm the same.	1. 1 set of spares to be considered for each set of battery bank. 1 set = 5% or 10 nos. whichever is more Hence, for 2 sets = 10% or 20 nos. whichever is more. 2. For 220V Ni-Cd TBG application, only KPH type battery is acceptable.
28	Battery for Charger			220V 0-1" - 160A 1-60" - 50A 61"-180" - 50A	HPGCL Yamuna nagar	2	120	5	1.25	1.14	183	1. Battery cell against battery bank installed at various locations - 10 nos. 2. MT cell container of each type - 10 nos. 3. Level indicator - 6 nos. 4. Vent plugs - 12 nos. 5. Inter-cell connector with hardware - 5% or 5 Nos. whichever is more for each set of battery bank. 6. Nuts, bolts and washer - 12 sets	TBG	500-800 AH	1.In Mandatory spares Battery dry cells of 10 no's and also empty containers of 10 no's are mentioned. Please confirm. 2.Level indicator is not applicable for Nickel cadmium batteries 3.Wheather 1 set of Mandatory spares have to be calculated for Each battery bank set. 4.500-800AH mentioned is not understandable. PIs explain whether any minimum rating applicable for Ni-Cd/Plante. 5.As per clarification provided by EDN, for 220V Ni-Cd TBG application, H type battery is to be provided for all projects PIs confirm the same.	1 & 2. Spares as mentioned in customer specification is provided and shall be applicable. 3. Mandatory spares mentioned in numbers and is applicable for entire project irrespective of no. of battery sets. 4. Minimum Rating 220V Battery – 500 AH Lead Acid Plante / 400 AH Ni-Cd (KPH Type) to be considered. 5. For 220V Ni-Cd TBG application, only KPH type battery is acceptable.	

29	Battery for Charger		220V 0-1" - 185A 1-60" - 60A 61-180" - 55A	GSECL Ukai	2	120	5	1.25	1.14	183	a) Battery cell against battery bank installed at various locations - 10 Nos. b) MT cell container of each type-10 Nos c) Level indicator- 6 Nos d) Vent plugs- 12 Nos. e) Inter-cell connector with hardware- 5% or 5 Nos. whichever is more for each set of battery bank. f) Nuts, bolts and washer- 12 Sets	TBG	Minimum Rating: 220V Battery – 1000 AH Lead Acid Plante / Ni-Cd (KPH Type) 48V Battery – 800 AH Lead Acid Plante / Ni-Cd (KPL Type)		1.In Mandatory spares Battery dry cells of 10 no's and also empty containers of 10 no's are mentioned. Please confirm. 2.Level indicator is not applicable for Nickel cadmium batteries 3.Wheather 1 set of Mandatory spares have to be calculated for Each battery bank set. 4.Minimum rating for Ni-CD battery is not missing. 5.As per clarification provided by EDN, for 220V Ni-Cd TBG application, if type battery is to be provided for all projects PIs confirm the same.	Item is removed from tender scope. Refer tender corrigendum for details
30	Battery for Charger		48V 0-180" - 53A	GSECL Ukai	1	120	5	1.25	1.14	40	a) Battery cell against battery bank installed at various locations - 10 Nos. b) MT cell container of each type-10 Nos c) Level indicator- 6 Nos d) Vent plugs- 12 Nos. e) Inter-cell connector with hardware- 5% or 5 Nos. whichever is more for each set of battery bank. f) Nuts, bolts and washer- 12 Sets	TBG	Minimum Rating: 220V Battery – 1000 AH Lead Acid Plante / Ni-Cd (KPH Type) 48V Battery – 800 AH Lead Acid Plante / Ni-Cd (KPL Type)		1.In Mandatory spares Battery dry cells of 10 no's and also empty containers of 10 no's are mentioned. Please confirm. 2.Level indicator is not applicable for Nickel cadmium batteries 3.Wheather 1 set of Mandatory spares have to be calculated for Each battery bank set. 4.Minimum rating for Ni-CD battery is not missing. 5.As per clarification provided by EDN, for 48V Ni-Cd TBG application, if type battery is to be provided for all projects PIs confirm the same.	Item is removed from tender scope. Refer tender corrigendum for details
31	Battery for UPS	145	0.9	128888.8889	Lara-Unit	2	60	4	1.25	1.1	287	2 Nos. of each type and Rating	EDN			
32	Battery for UPS	150	0.9	133333.3333	Singauli-Unit	2	60	4	1.25	1.1	287	2 Nos. of each type and Rating	EDN			
33	Battery for UPS	150	0.9	133333.3333	Spat-Unit	1	60	4	1.25	1.1	287	2 Nos. of each type and Rating	EDN			
34	Battery for UPS	160	0.9	142222.2222	Kodema-Unit	2	60	4	1.25	1.1	287	2 Nos. of each type and Rating	EDN			
35	Battery for Charger			750	Lara-SG	4	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
36	Battery for Charger			800	Lara-BOP	4	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
37	Battery for Charger			775	Lara-Common CER	2	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
38	Battery for Charger			425	Lara-TG	4	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
39	Battery for Charger			713	Singauli-SG	4	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
40	Battery for Charger			760	Singauli-BOP	4	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
41	Battery for Charger			736	Singauli-Common CER	2	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
42	Battery for Charger			404	Singauli-TG	4	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
43	Battery for Charger			787	Spat-SG	2	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
44	Battery for Charger			840	Spat-BOP	2	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
45	Battery for Charger			447	Spat-TG	2	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
46	Battery for Charger			751	Kodema-SG	4	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
47	Battery for Charger			787	Kodema-BOP	4	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
48	Battery for Charger			710	Kodema-Common	2	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
49	Battery for Charger			390	Kodema-TG	4	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
50	Battery for Charger			675	Raghunathpur-SG	4	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
51	Battery for Charger			720	Raghunathpur-BOP	4	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
52	Battery for Charger			697	Raghunathpur-Common	2	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
53	Battery for Charger			382	Raghunathpur-TG	4	60	4	1.25	1.16	1938	2 Nos. of each type and Rating	EDN			
54	Erection Supervision & Commissioning Charges-TBG Requirement for 220V Batteries											TBG		12		
55	Erection Supervision & Commissioning Charges of 24V/48V Batteries-EDN/TBG Requirement											All		67		
56	Erection Supervision & Commissioning Charges of UPS Batteries											All		7		
57	Electrolyte											All		10000	Extra electrolyte for all projects is being considered in the spec, further 10000 litres of electrolyte is an extraordinary qty. Please check and confirm the qty	Price for extra electrolyte to be quoted inline with tender requirement
58	Battery accessories per battery bank											All		132		

Project	Location	Item rescription	Battery bank qty as per tender	Unit	Query	BHEL Reply
1X800 MW SIPAT	SIPAT- Main plant Location	Battery for Charger	4	PEM	1.As per our past experience battery requirement for each unit shall be 2 battery banks, however 4 sets are required as per BOQ. As the project is 1 X 800MW. please re-confirm the no of battery banks for each unit. 2.As per BHMS specification, one PC shall be supplied to each unit. Confrm the no of units in this project.	Battery bank qty is 2 & 4 as against 4 & 8 mentioned in BOQ.
2X800 MW SINGRAULI	Singrauli- Main plant Location	Battery for Charger	8	PEM	1.As per our past experience battery requirement for each unit shall be 2 battery banks, however 8 sets are required as per BOQ. As the project is 2 X 800 MW, please confirm the no of battery banks for each unit. 2. As per BHMS specification, one PC shall be supplied to each unit. Confrm the no of units in this project.	
2X660 MW KORBA WEST	Korba West - Main plant Location	Battery for Charger	8	PEM	1.As per our past experience battery requirement for each unit shall be 2 battery banks, however 8 sets are required as per BOQ. As the project is 2 X 660 MW, please confirm the no of battery banks for each unit. 2. As per BHMS specification, one PC shall be supplied to each unit. Confrm the no of units in this project.	
1X800 MW DARLIPALLI	Darlipalli - Main Plant Location	Battery for Charger	2	PEM	1.As per BHMS specification, one PC shall be supplied to each unit. Confrm the no of units in these projects.	1x800 MW Darlipalli
1X800 MW SINGRAINI	Singreni - Main Plant area	Battery for Charger	2	PEM		1x800 MW Singraini
1X800 MW YAMUNANAGAR	Yamunanager-Main Plant Location	Battery for Charger	2	PEM		1x800 MW Yamunanaagar
1X800 MW SIPAT	SIPAT- OFFSITE	Battery for Charger	2	PEM	1.As per our past experience , we have not supplied BHMS for OFF site areas.However the current tender requirement requires BHMS for offsite locations also. Please confirm if BHMS is to be supplied for OFFSITE locations also. 2. If BHMS is to be suplied to OFFSITE locations please confirm on the below. A)As per BHMS spec , one PC shall be supplied for each unit, however PC requirement for off ste locations is not mentioned. Please confirm the requirement of PC for BHMS for OFFSITE areas. B) Distance to be considered for cable and connectors for BHMS for each location in OFFSITE areas	BHMS is not applicable for offsite AREA
2X800 MW SINGRAULI	Singrauli - OFFSITE	Battery for Charger	2	PEM		
2X660 MW KORBA WEST	Korba west -OFFSITE	Battery for Charger	2	PEM		
1X800 MW DARLIPALLI	Darlipalli - Water System Area	Battery for Charger	2	PEM		
1X800 MW DARLIPALLI	Darlipalli - FOPH Area	Battery for Charger	2	PEM		
1X800 MW DARLIPALLI	Darlipalli - RWPH Area	Battery for Charger	2	PEM		
2X800 MW LARA STPP STAGE-II	2X800MW Lara- CHP	Battery for Charger	2	ISG		
2X800 MW LARA STPP STAGE-II	2X800MW Lara- AHP	Battery for Charger	2	ISG		
2X800 MW SINGRAULI	2X800MW Singrauli-CHP-1	Battery for Charger	2	ISG		
2X800 MW SINGRAULI	2X800MW Singrauli-CHP-2	Battery for Charger	2	ISG		
		BHMS-PEM Requirement	46	PEM/ISG	The BHMS requirement for all sites is not uniform as the no of cells in each battery is not uniform, for certain locations we have to offer 1 string (1X 169 cells) , for certain location we have to offer 2 strings (2 X 169 cells) and certain locations 4 strings (4 X 169 cells) based on the load and battery model availability. Hence Uniform price for all BHMS cannot be offered and individual . Kindly provide the option for quoting individual BHMS price for respective location and battery bank	Shall provide the same in detailed price break up.
		COMMISSIONING OF BHMS-PEM Requirement	46	PEM/ISG	The BHMS requirement for all sites is not uniform as the no of cells in each battery is not uniform, for certain locations we have to offer 1 string (1X 169 cells) , for certain location we have to offer 2 strings (2 X 169 cells) and certain locations 4 strings (4 X 169 cells) based on the load and battery model availability. Hence Uniform price for all BHMS cannot be offered and individual . Kindly provide the option quoting individual BHMS Commissioning price for respective location and battery bank	Shall provide the same in detailed price break up.
		SUPERVISION OF ERECTION - BATTERY- PEM Requirement	46	PEM/ISG	As per the battery sizings, the battery ratings including the no scells and no of string are not uniform for all battery banks. Hence we cannot offer uniform Supervision of erection charges for all battery banks. Kindly provide option for quoting price for individual battery bank	Shall provide the same in detailed price break up.
		COMMISSIONING OF BATTERY-PEM Requirement	46	PEM/ISG	As per the battery sizings, the battery ratings including the no scells and no of string are not uniform for all battery banks. Hence we cannot offer uniform commissioning charges for all battery banks. Kindly provide option for quoting price for individual battery bank	Shall provide the same in detailed price break up.
		Erection Supervision & Commissioning Charges-TBG Requirement for 220V Batteries	12	TBG	Kindly provide option for quoting Erection and commissioning charges for individual battery bank	Shall provide the same in detailed price break up.
		Erection Supervision & Commissioning Charges of 24V/48V Batteries-EDN/TBG Requirement	67	All	Kindly provide option for quoting Erection and commissioning charges for individual battery bank	Shall provide the same in detailed price break up.
		Erection Supervision & Commissioning Charges of UPS Batteries	7	All	Kindly provide option for quoting Erection and commissioning charges for individual battery bank	Shall provide the same in detailed price break up.

SLC No	Pg No	Clause No	Clause	Comment - 02-07-2026	BHEL Reply
5	7 of 130	Erection Supervision & Commissioning	Scope	For the scope of "Erection Supervision and Commissioning", we assume that the below activities are in BHEL Scope.. Kindly confirm 1. Arrangement of adequate required manpower for battery installation 2. Arrangement of tools & tackles for shifting battery materials from store to battery room. 3. Arrangement of transportation vehicle for shifting battery materials 4. Arrangement of charger unit for commissioning activities 5. Arrangement of suitable resistive load banks with power cables.	Noted
7	69 of 130		Quoted per cell per AH shall be maintained for +/-15% variation of battery model limited to nearby catalogue model of vendor	We cannot accept to maintain the same prices for any tolerance. Based on the battery sizing change, the price will be discussed and agreed upon.	To be quoted inline with specification.
8	77 of 130	BHMS	Supply of Suitable Shunt Box as per cable size and Glass Tube Fuse between each cell and BHMS.	We are providing a Hall-effect current sensor; therefore, a shunt box is not required. We will also provide a fuse for each cell sensing line.	Subject to end customer approval without any techno commercial implication to BHEL
9	77 of 130	BHMS	Kindly note that the tentative distance between BHMS panel to converter is 150m	One Master Panel will be provided for each DC Set. The Master Panel supports Modbus TCP/IP and Modbus RS-485 communication. We will provide 100 meters of communication cable from the battery room to the DC/IMS room. The EPC/End User shall be responsible for laying the communication cable and providing suitable termination/junction boxes near the Master Panel and the PC. One PC will be provided for Unit 1, and one PC will be provided for Unit 2.	Please follow specification . All details shall be finalized during detailed engineering.
10	112 of 130	Battery Accessories	Electrolyte testing kit	Hydrometer will be provided in place of an electrolyte testing kit	Noted
11	112 of 130	Battery Accessories	Set of Hydro meter syringes suitable for vent holes in different cells	Syringe is inbuilt within the hydrometer. Hence separate syringes are not considered.	Noted
12	112 of 130	Battery Accessories	Wall Mounting Holder For Hydro Meter And Thermometer - 2 Nos	The number of Hydrometers and Thermometers are 5 Nos but the all mounting holders are only 2 Nos. Pls clarify the quantity of both	To be quoted inline with specification.
13	109 of 130		i) Cable connection, Lugs & Glands for 220V Battery for PEM requirements ii) Cable Size from terminal Take-off board to Fuse / MCCB Box:	Supply of Cables, Lugs and glands will not be in BHEL scope	Follow specification
14	114 of 130		Design Margin	Desing margin is mentioned as 1 where as it is indicated as 1.2 in sizing calculation	Query is not in line. Inform Unit scope, project and battery location.
15	115 of 130		ECV	For Battery Sizing calculations : ECV in Annexure 1 is 1.14V per cell ECV in sizing calculation is 1.16V per cell Pls clarify on the ECV to consider for calculations	Query is not in line. Inform Unit scope, project and battery location.
16	120 of 130		QAP	Earlier approved QAP of BHEL will be submitted (Similar to the comment on Pg No 85 for Plante battery QAP)	NTPC approved QAP shall be applicable
17	126 of 130		Load cycle	Pls provide clarity on which battery this load cycle belongs to? Pls indicate locations / project names for which this load cycle is applicable.	Refer attachment specification extract with Unit, Project and location scope details.
18	127 - 130		Load Cycle	Pls provide clarity on which battery this load cycle belongs to? Pls indicate locations / project names for which this load cycle is applicable	Refer attachment specification extractt with Unit, Project and location scope details.
19	89 & 116			"Load Duty Cycle for 220V DC Battery for PEM-Main Plant" & "Load Duty Cycle for 220V DC Battery for Main Plant" are both the same.. Pls clarify	Yes
20	122 of 130		SOP - Ni-CD battery 2.2 Type Test : SLC No a), b), c), d) is mentioned as witness.	A valid type test certificate will be submitted. The same cannot be witnessed. We shall follow as per earlier approved NTPC QAP	noted
21		Annexure 1	SLC No 1 to 16	The load cycles of PEM and ISG are not discreetly indicated in the specifications.. Pls provide clarity of load cycle for each SLC No 1 to 26	Refer attachment specification extract with Unit, Project and location scope details.
22		Annexure 1	SLC No 22 to 30	Under Remarks : Kindly clarify the reason for Ni-Cd (KPL Type) for 48V Battery. The battery choses will be KPH type only and not KPL	KPL type as per customer contract
23		Annexure 1	SLC No 20	BHMS Spares- 5% of installed capacity : This cannot be provided as each location has different quantity of cells Hence BHMS spares will not be provided	The BHMS (Battery Health Monitoring System) design shall be entirely the responsibility of the bidder/vendor. BHEL has specified only the required functional outputs and performance requirements. The vendor shall prepare and submit the detailed drawings along with the Bill of Materials (BOM) for approval. The mandatory spares shall be 5% of the final approved BOM quantity, which shall be supplied as part of the scope of work without any techno commercial implication to BHEL.
24		Annexure 1	SLC No 17 & 18	Pls confirm that the Sup of Erection and Commissioning activity will happen in one go as two different line items are being requested	The supervision of erection and commissioning (E&C) activities shall be carried out in accordance with the site execution schedule. The bidder's representative shall be deputed as and when required for 1 bank of Battery , based on the site requirements, and the schedule will be communicated by BHEL during the execution of the project.
25		Annexure 1	SLC No 18	COMMISSIONING OF BATTERY-PEM Requirement Pls confirm that the battery charger and discharger required for the commissioning activities will be provided by BHEL	Confirmed
26		Mandatory spares	Mandatory spares	Level indicators are not applicable for Ni-Cd batteries.. Hence not considered	noted

27		Annexure 1	Sl No 28			Pls indicate the minimum Ah to be considered for Ni-CD battery	Minimum Rating 220V Battery – 500 AH Lead Acid Plants / 400 AH Ni-Cd (KPH Type) to be considered.
28		Annexure 1	Sl No 29			Pls indicate the minimum Ah to be considered for Ni-CD battery	Item is removed from tender scope. Refer tender corrigendum for details
29		Annexure 1	Sl No 30			Pls indicate the minimum Ah to be considered for Ni-CD battery	Item is removed from tender scope. Refer tender corrigendum for details
30							Blank
31		Mandatory spares	Mandatory spares			TBG - DVC Koderma, Singreni, Korba. Pls clarify the quantity of sets (2 Sets) mentioned in the spares. Does this mean that 2 sets of Mandatory spares are to be provided per battery bank?	1 set of spares to be considered for each set of battery bank. 1 set = 5% or 10 nos. whichever is more. Hence, for 2 sets = 10% or 20 nos. whichever is more.
32		Mandatory spares	Mandatory spares			TBG - NTPC Singrauli Pls clarify the quantity of sets (4 Sets) mentioned in the spares. Does this mean that 4 sets of Mandatory spares are to be provided per battery bank?	1 set of spares to be considered for each set of battery bank. 1 set = 5% or 10 nos. whichever is more. Hence, for 2 sets = 10% or 20 nos. whichever is more. (4 set is corrected to 2 set)
33		Annexure 1	DM for Yamunanagar : 10% for PEM			What is the design margin to be considered for TBG?	As per format, design margin is part of Load indicated.
34		Annexure 1	Design margin			Apart from Main plant Yamunanagar, we understand that the design margin is 1 for all other batteries of PEM, ISG, TPG and EDN. Pls confirm	For PEM Batteries , it is confirmed.
35		Annexure 1	BHMS - 5% Spare of installed capacity			Spare includes complete BHMS system or Voltage / Current and temperature sensor? Also, is it 5% of installed capacity of each site or 5% of the total capacity supplied to PEM & ISG for this complete contract?	For PEM : The vendor shall prepare and submit the detailed drawings along with the Bill of Materials (BOM) for approval. The mandatory spares shall be 5% of the final approved BOM quantity, which shall be supplied as part of the scope of work without any techno commercial implication to BHEL.
37		Annexure 1	Sl No 17, 54, 55, 56			Since NTPC requires 4 cycle charge and discharge cycle, the cost for I&C of NTPC will be higher than NON NTPC.. Hence separate line items to be provided for I&C of NTPC and NON NTPC.	The same can be provided project wise during detailed break up.

UNIT-PEM

Load Duty Cycle for 220V DC Battery for Main Plant

Project	Duration in Min	Current	Factors to be considered in Battery Sizing	
1X800 MW SIPAT	0 - 1	1692	AGING FACTOR :	1.25
	1-14	662	MIN.ELECTROLYTIC TEMP.:	15 °C
	14-15	1779	END CELL VOLTAGE:	1.14V
	15-44	1109	TEMPERATURE CORRECTION FACTOR:	As per manufacturer's data
	44-45	1121		
2X800 MW SINGRAULI	0 - 1	1720	AGING FACTOR:	1.25
	1-14	668	MIN.ELECTROLYTIC TEMP.:	15 °C
	14-15	1786	END CELL VOLTAGE :	1.14V
	15-44	1115	TEMPERATURE CORRECTION FACTOR :	As per manufacturer's data
	44-45	1153		
2X660 MW KORBA WEST	0 - 1	1610	AGING FACTOR:	1.25
	1-14	544	MIN.ELECTROLYTIC TEMP.:	15 °C
	14-15	1669	END CELL VOLTAGE :	1.14V
	15-44	994	TEMPERATURE CORRECTION FACTOR :	As per manufacturer's data
	44-45	1007		
1X800 MW DARLIPALLI	0 - 1	1704	AGING FACTOR:	1.25
	1-14	618	MIN.ELECTROLYTIC TEMP.:	15 °C
	14-15	1735	END CELL VOLTAGE :	1.14V
	15-44	1065	TEMPERATURE CORRECTION FACTOR :	As per manufacturer's data
	44-45	1077		
1X800 MW SINGRAINI	0 - 1	1627	AGING FACTOR:	1.25
	1-14	605	MIN.ELECTROLYTIC TEMP.:	15 °C
	14-15	1723	END CELL VOLTAGE :	1.14V
	15-44	1052	TEMPERATURE CORRECTION FACTOR :	As per manufacturer's data
	44-45	1065		
1X800 MW YAMUNANAGAR	0 - 1	1735	AGING FACTOR:	1.25
	1-14	618	MIN.ELECTROLYTIC TEMP.:	5 °C
	14-15	1736	END CELL VOLTAGE :	1.14V
	15-119	1070	TEMPERATURE CORRECTION FACTOR :	As per manufacturer's data
	119-120	1085	DESIGN MARGIN	10%



TECHNICAL SPECIFICATION
DC Lead Acid/ Ni-Cd Battery

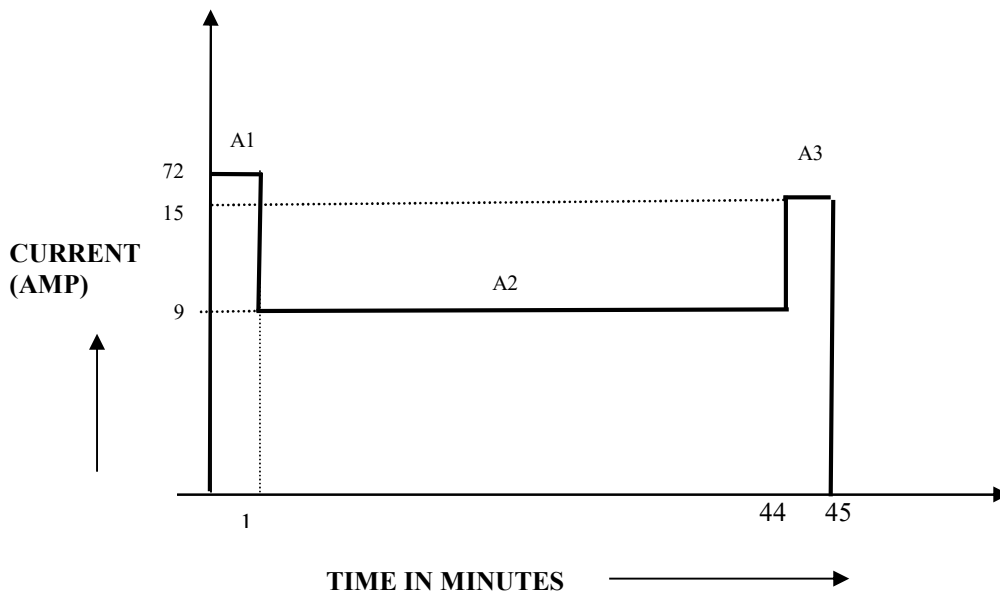
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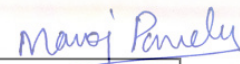
REV. No. 00

UNIT-PEM

Location: All Off site (Including Water system/FOPH/RWPH)

10.2 220V DC SYSTEM LOAD DUTY CYCLE (OFFSITE AREA)






DOCUMENT TITLE
DESIGN MEMORANDUM FOR 220V DC SYSTEM

DOC. NO. PE-DC-512-508-E001

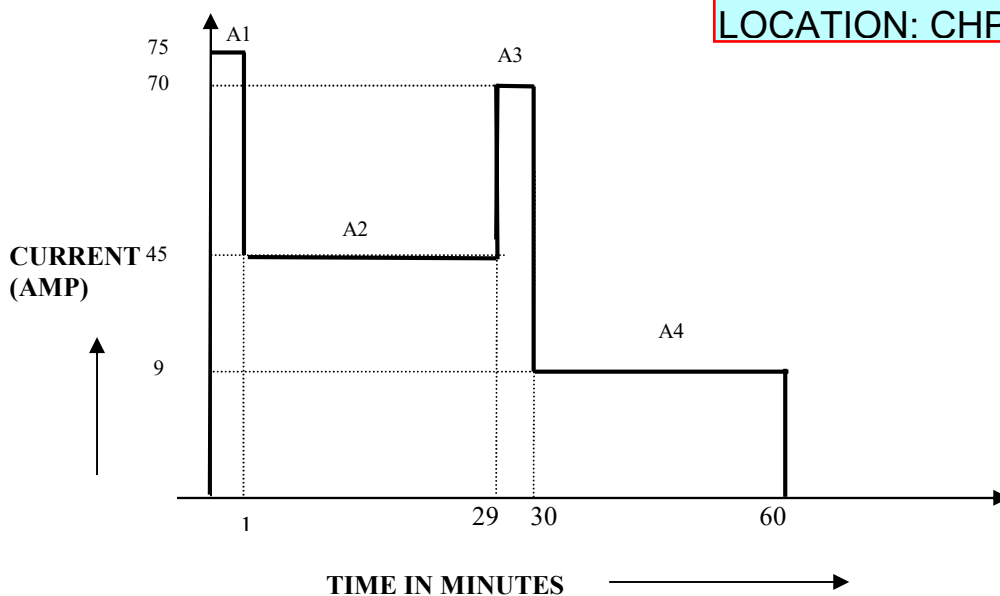
REV. No. 03 DATE 03.07.25

2X800 MW SINGRAULI STPP STAGE-III

SHEET 11 of 20

10.3 220DC LOAD DATA FOR BATTERY OF CHP & AHP AREA-LOCATED IN AHP MCC-2 (NR TP-21)

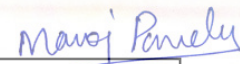
UNIT: ISG
PROJECT: SINGRAULI
LOCATION: CHP 1



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. AGEING FACTOR : 1.25
2. MIN.ELECTROLYTIC TEMP. : 15 °C
3. END CELL VOLTAGE : 1.85V (for Lead-Acid Plante) & 1.14V (for Ni-Cd) PER CELL
4. TEMPERATURE CORRECTION FACTOR: As per manufacturer's data

Note: The minimum Battery Bank Rating shall be 150 AH for lead acid plante/90AH for NI-CD High Discharge (KPH) type batteries.




DOCUMENT TITLE
DESIGN MEMORANDUM FOR 220V DC STSEM

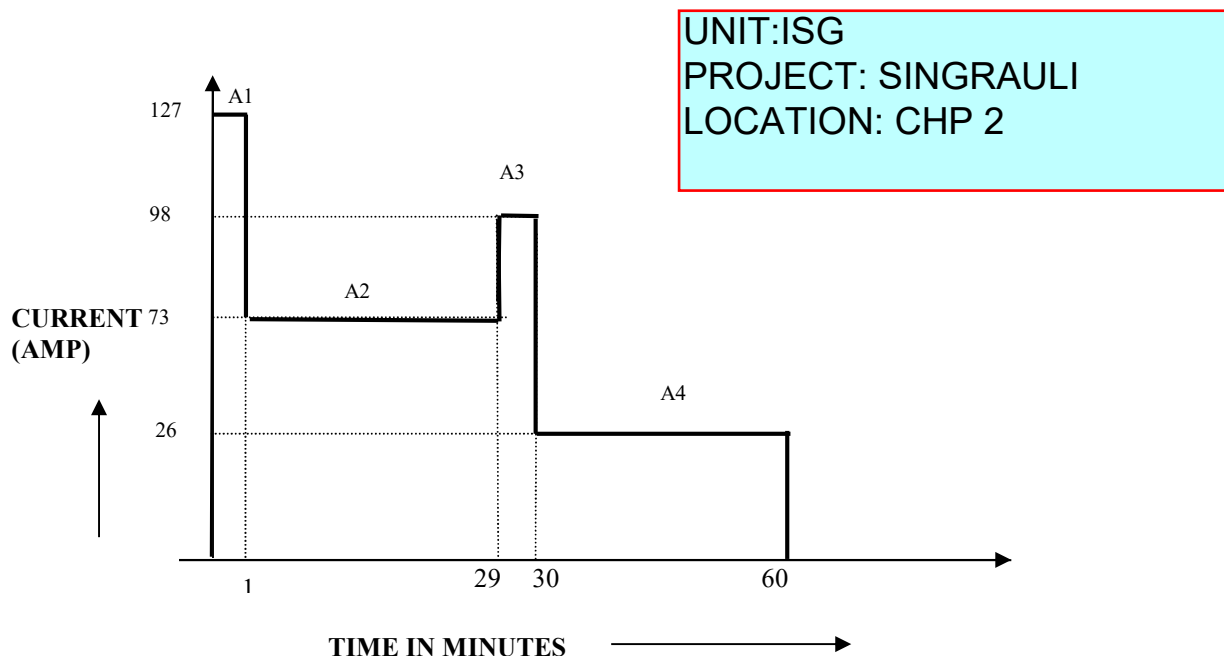
DOC. NO. PE-DC-512-508-E001

REV. No. 03 DATE 03.07.25

2X800 MW SINGRAULI STPP STAGE-III

SHEET 13 of 20

10.3 220DC LOAD DATA FOR BATTERY OF CHP AREA-LOCATED IN CHP MCC-2



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. AGEING FACTOR : 1.25
2. MIN.ELECTROLYTIC TEMP. : 15 °C
3. END CELL VOLTAGE : 1.85V (for Lead-Acid Plante) & 1.14V (for Ni-Cd) PER CELL
4. TEMPERATURE CORRECTION FACTOR: As per manufacturer's data

Note: The minimum Battery Bank Rating shall be 150 AH for lead acid plante/90AH for NI-CD High Discharge (KPH) type batteries.



DOCUMENT TITLE
DESIGN MEMORANDUM FOR 220V DC STSTEM

DOC. NO. PE-DC-508-508-E001

REV. No. 00 DATE 17.02.24

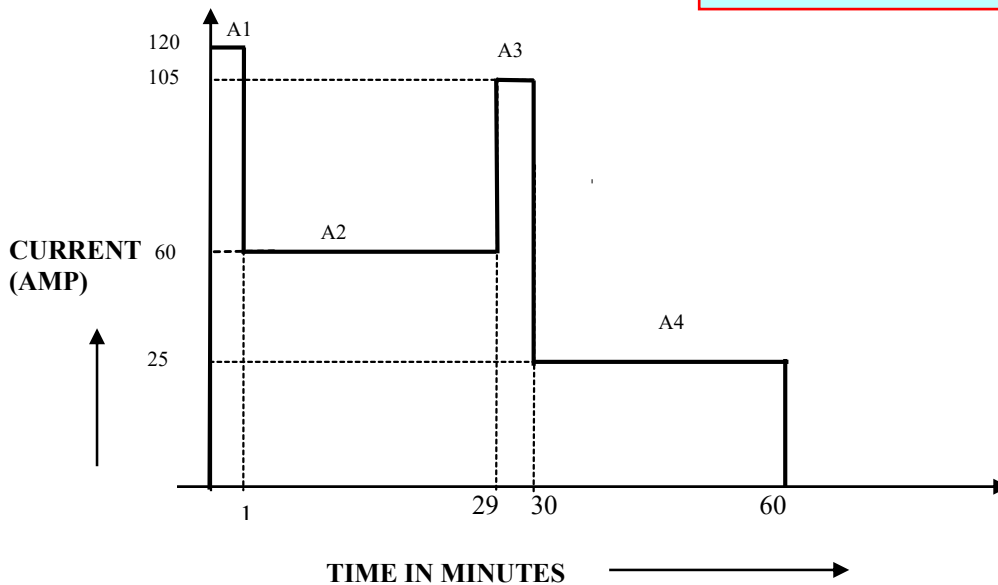
2X800 MW LARA STPP STAGE-II

SHEET 11 of 24

Ramesh

220V DC SYSTEM LOAD DUTY CYCLE (CHP 11/3.3kV/415V MCC ROOM CATERING CHP/LHP/GHP LOADS/ AHP 11/3.3kV/415V MCC ROOM CATERING AHP LOADS:-

UNIT: ISG
PROJECT: LARA
LOCATION: CHP



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. AGEING FACTOR : 1.25
2. MIN.ELECTROLYTIC TEMP. : 15 °C
3. END CELL VOLTAGE : 1.85V (for Lead-Acid Plante) & 1.14V (for Ni-Cd) PER CELL
4. TEMPERATURE CORRECTION FACTOR: As per manufacturer's data



DOCUMENT TITLE
DESIGN MEMORANDUM FOR 220V DC STSTEM

DOC. NO. PE-DC-508-508-E001

REV. No. 00 DATE 17.02.24

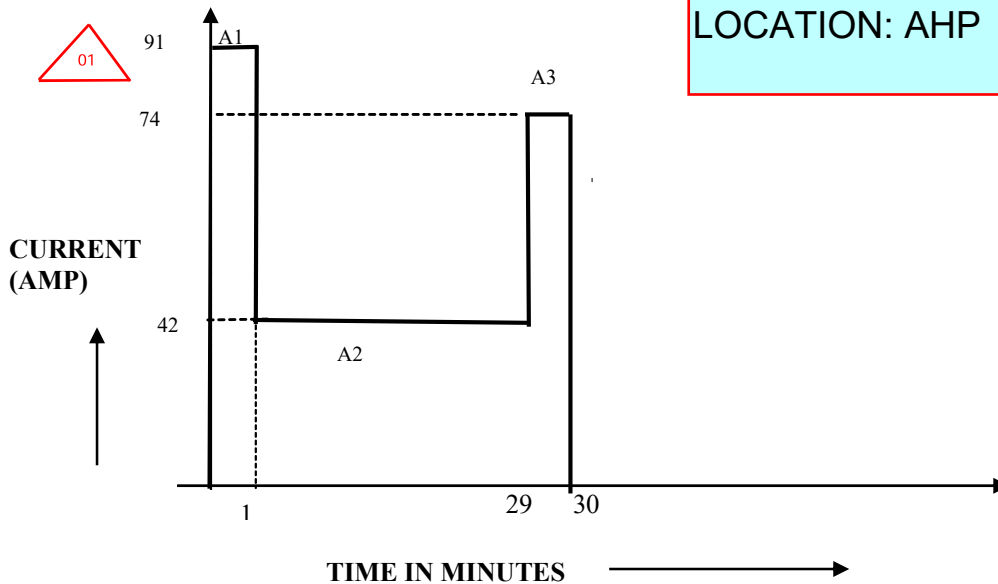
2X800 MW LARA STPP STAGE-II

SHEET 12 of 24

01

10.4 220V DC SYSTEM LOAD DUTY CYCLE (AHP 11 / 3.3kV / 415V MCC ROOM- CATERING AHP LOADS)

UNIT: ISG
PROJECT: LARA
LOCATION: AHP



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. AGEING FACTOR : 1.25
2. MIN.ELECTROLYTIC TEMP. : 15 °C
3. END CELL VOLTAGE : 1.85V (for Lead-Acid Plante) & 1.14V (for Ni-Cd) PER CELL
4. TEMPERATURE CORRECTION FACTOR: As per manufacturer's data

Si No	Clause No	Page No	Description as per sepc	Clarification	BHEL REPLY REMARKS
#REF!	Annexure 1 Scope of supply	71	Load details	Load details are not mapped in the scope of supply as well as in load cycle sheets.	Refer attachment specification extract with Unit, Project and location scope details.
#REF!	Annexure 1 Scope of supply	71	Current load + Design Margin	Our understanding is that the design margin has been considered in your load cycle calculations. However, as per IEEE 485 and IEEE 1115, the design margin is 10% for LA & 22% for Ni-Cd, respectively. Based on these design margins, the required battery capacities for LA and Ni-Cd should be different. However, the load cycle indicates the same capacity value for both battery types. kindly verify the calculations and confirm the same	The load cycle is fixed, and the design parameters have already been specified in the attached load cycle.(i.e. Aging factor) The bidder shall design and size the battery strictly in accordance with the attached load cycle. No deviation from the specified load cycle shall be permitted.
#REF!	Pt 22, 23, 25 & 27 of Annexure 1 Scope of supply	72	Total load details provided for 179Mins	Whereas back requested for 180Mins	Back-up time is 180 mins as per specification.
#REF!	Pt 28 - 30 of Annexure 1 Scope of supply	72	Total load details provided for 179Mins	Whereas back requested for 120Mins	Back-up time is 120 mins as per specification. Project GSECL Ukai (sr no. 29,30) is removed from tender scope. Refer tender corrigendum for more details.
#REF!	Pt 31 - 34 of Annexure 1 Scope of supply	72	Current load + Design Margin	Based on the UPS rating calculated current is much lower than details mentioned under Current load + Design Margin. Plz clarify which one to follow.	Battery sizing and current to be calculated as per 'battery sizing methodology for UPS system' document part of specification
#REF!	Pt 35 - 53 of Annexure 1 Scope of supply	72	Number of cells per Battery bank for Plante is mentioned as 12/24	Plz clarify the nominal voltage to be considered	24V per bank
#REF!	Pt 20 of Annexure 1 Scope of supply	72	BHMS Spares- 5% of installed capacity	Plz specify the materials list to consider for spares.	The BHMS (Battery Health Monitoring System) design shall be entirely the responsibility of the bidder/vendor. BHEL has specified only the required functional outputs and performance requirements. The vendor shall prepare and submit the detailed drawings along with the Bill of Materials (BOM) for approval. The mandatory spares shall be 5% of the final approved BOM quantity, which shall be supplied as part of the scope of work without any techno commercial implication to BHEL.
#REF!	BHMS	77	DC BATTERY HEALTH MONITORING SYSTEM	Plz clarify whether laptop to be considered or not	LAPTOP/ Desktop shall be finalized during detailed engineering without any techno commercial implication to BHEL.

UNIT-PEM

Load Duty Cycle for 220V DC Battery for PEM-Main Plant

Project	Durati on in Min	Current	Factors to be considered in Battery Sizing	
1X800 MW SIPAT	0 - 1	1692	AGING FACTOR :	1
	1-14	662	MIN.ELECTROLYTIC TEMP.:	15 °C
	14-15	1779	END CELL VOLTAGE:	1.85V
	15-44	1109	TEMPERATURE CORRECTION FACTOR:	As per manufacturer's data
	44-45	1121		
2X800 MW SINGRAULI	0 - 1	1720	AGING FACTOR:	1.25
	1-14	668	MIN.ELECTROLYTIC TEMP.:	15 °C
	14-15	1786	END CELL VOLTAGE :	1.85V
	15-44	1115	TEMPERATURE CORRECTION FACTOR :	As per manufacturer's data
	44-45	1153		
2X660 MW KORBA WEST	0 - 1	1610	AGING FACTOR:	1
	1-14	544	MIN.ELECTROLYTIC TEMP.:	15 °C
	14-15	1669	END CELL VOLTAGE :	1.85V
	15-44	994	TEMPERATURE CORRECTION FACTOR :	As per manufacturer's data
	44-45	1007		
1X800 MW DARLIPALLI	0 - 1	1704	AGING FACTOR:	1
	1-14	618	MIN.ELECTROLYTIC TEMP.:	15 °C
	14-15	1735	END CELL VOLTAGE :	1.85V
	15-44	1065	TEMPERATURE CORRECTION FACTOR :	As per manufacturer's data
	44-45	1077		
1X800 MW SINGRAINI	0 - 1	1627	AGING FACTOR:	1
	1-14	605	MIN.ELECTROLYTIC TEMP.:	15 °C
	14-15	1723	END CELL VOLTAGE :	1.85V
	15-44	1052	TEMPERATURE CORRECTION FACTOR :	As per manufacturer's data
	44-45	1065		
1X800 MW YAMUNANAGA R	0 - 1	1735	AGING FACTOR:	1
	1-14	618	MIN.ELECTROLYTIC TEMP.:	5 °C
	14-15	1736	END CELL VOLTAGE :	1.85V
	15-119	1070	TEMPERATURE CORRECTION FACTOR :	As per manufacturer's data
	119- 120	1085	DESIGN MARGIN	10%



TECHNICAL SPECIFICATION
DC Lead Acid/ Ni-Cd Battery

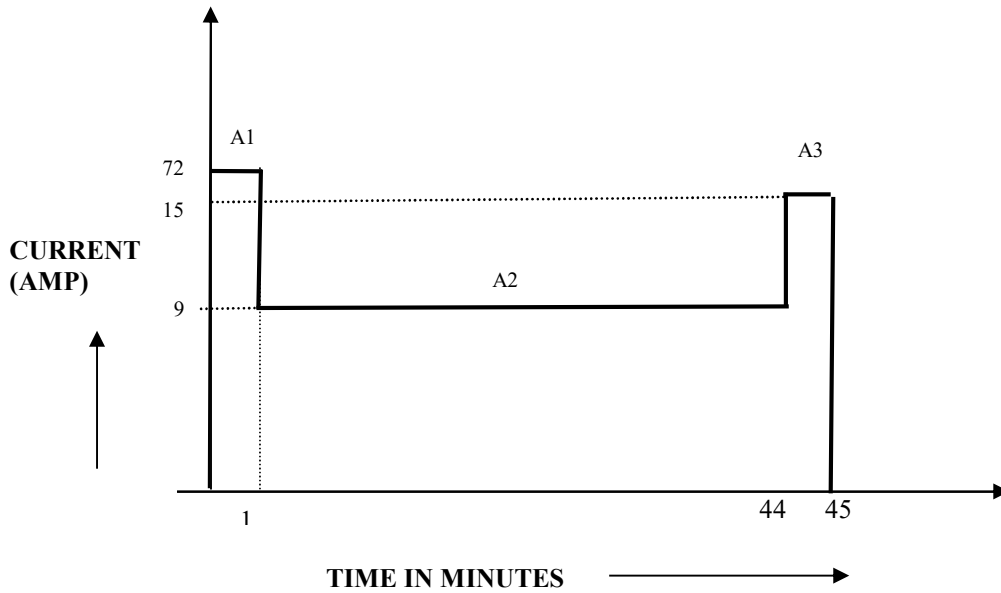
PE-TS-508-508-E001

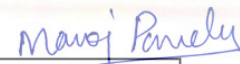
REV. No. 00

UNIT-PEM

Location: All Off site (Including Water system/FOPH/RWPH)

10.2 220V DC SYSTEM LOAD DUTY CYCLE (OFFSITE AREA)






DOCUMENT TITLE
DESIGN MEMORANDUM FOR 220V DC SYSTEM

DOC. NO. PE-DC-512-508-E001

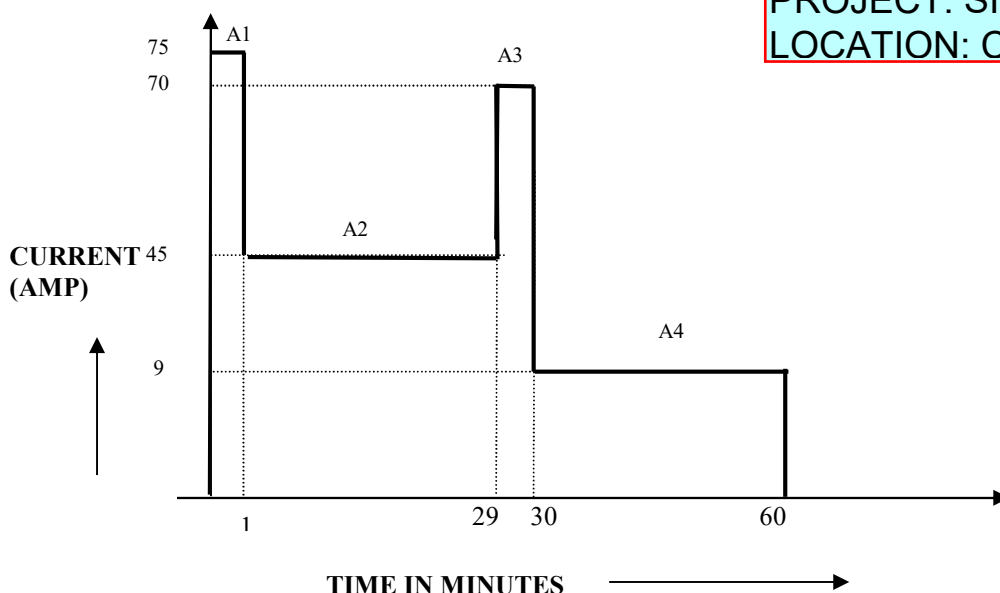
REV. No. 03 DATE 03.07.25

2X800 MW SINGRAULI STPP STAGE-III

SHEET 11 of 20

10.3 220DC LOAD DATA FOR BATTERY OF CHP & AHP AREA-LOCATED IN AHP MCC-2 (NR TP-21)

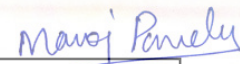
UNIT: ISG
PROJECT: SINGRAULI
LOCATION: CHP 1



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. AGEING FACTOR : 1.25
2. MIN.ELECTROLYTIC TEMP. : 15 °C
3. END CELL VOLTAGE : 1.85V (for Lead-Acid Plante) & 1.14V (for Ni-Cd) PER CELL
4. TEMPERATURE CORRECTION FACTOR: As per manufacturer's data

Note: The minimum Battery Bank Rating shall be 150 AH for lead acid plante/90AH for NI-CD High Discharge (KPH) type batteries.




DOCUMENT TITLE
DESIGN MEMORANDUM FOR 220V DC STSEM

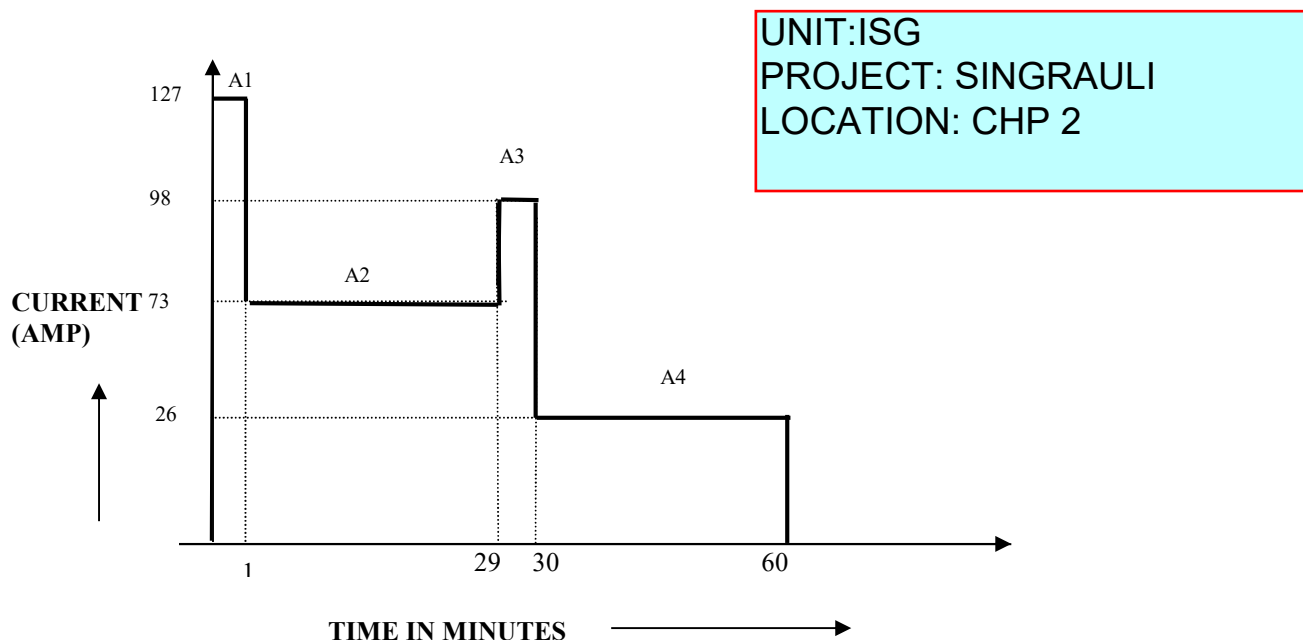
DOC. NO. PE-DC-512-508-E001

REV. No. 03 DATE 03.07.25

2X800 MW SINGRAULI STPP STAGE-III

SHEET 13 of 20

10.3 220DC LOAD DATA FOR BATTERY OF CHP AREA-LOCATED IN CHP MCC-2



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. AGEING FACTOR : 1.25
2. MIN.ELECTROLYTIC TEMP. : 15 °C
3. END CELL VOLTAGE : 1.85V (for Lead-Acid Plante) & 1.14V (for Ni-Cd) PER CELL
4. TEMPERATURE CORRECTION FACTOR: As per manufacturer's data

Note: The minimum Battery Bank Rating shall be 150 AH for lead acid plante/90AH for NI-CD High Discharge (KPH) type batteries.



DOCUMENT TITLE
DESIGN MEMORANDUM FOR 220V DC STSTEM

DOC. NO. PE-DC-508-508-E001

REV. No. 00 DATE 17.02.24

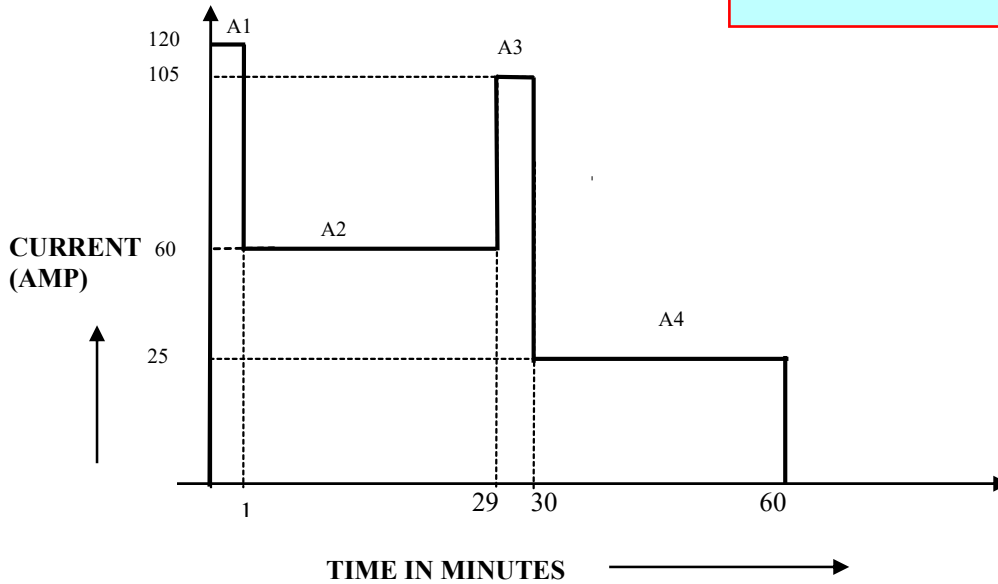
2X800 MW LARA STPP STAGE-II

SHEET 11 of 24

Ramesh

220V DC SYSTEM LOAD DUTY CYCLE (CHP 11/3.3kV/415V MCC ROOM CATERING CHP/LHP/GHP LOADS/ AHP 11/3.3kV/415V MCC ROOM CATERING AHP LOADS:-

UNIT:ISG
PROJECT: LARA
LOCATION: CHP



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. AGEING FACTOR : 1.25
2. MIN.ELECTROLYTIC TEMP. : 15 °C
3. END CELL VOLTAGE : 1.85V (for Lead-Acid Plante) & 1.14V (for Ni-Cd) PER CELL
4. TEMPERATURE CORRECTION FACTOR: As per manufacturer's data



DOCUMENT TITLE
DESIGN MEMORANDUM FOR 220V DC STSTEM

DOC. NO. PE-DC-508-508-E001

REV. No. 00 DATE 17.02.24

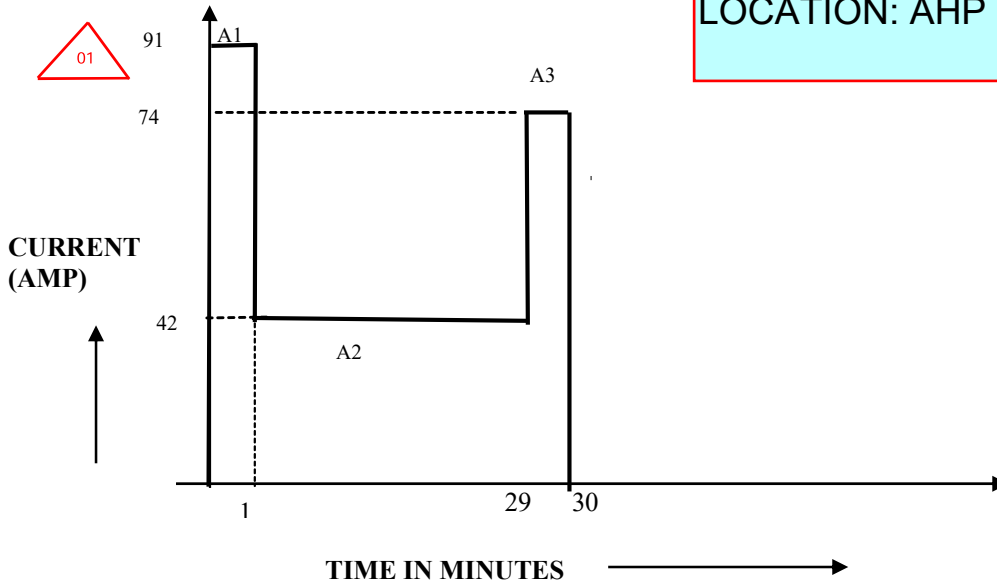
2X800 MW LARA STPP STAGE-II

SHEET 12 of 24

01

10.4 220V DC SYSTEM LOAD DUTY CYCLE (AHP 11 / 3.3kV / 415V MCC ROOM- CATERING AHP LOADS)

UNIT: ISG
PROJECT: LARA
LOCATION: AHP



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

1. AGEING FACTOR : 1.25
2. MIN.ELECTROLYTIC TEMP. : 15 °C
3. END CELL VOLTAGE : 1.85V (for Lead-Acid Plante) & 1.14V (for Ni-Cd) PER CELL
4. TEMPERATURE CORRECTION FACTOR: As per manufacturer's data