

ANNEXURE-I OF SCOPE SUPPLY

		Agriculture Batteries of UPS																					
Sl No.	Battery for UPS/ Charger	UPS RATING (KVA)	Inverter efficien cy	Current Load + design margin	Project Name	Battery Bank Quantity (Sets)	Back up time (Min)	Minim um Temp (°C)	Aging Factor for Ni- Cd	End Cell Voltage (ECV) for Ni-Cd (V)	Number of cells per Battery bank for Ni- Cd	Aging Factor for Plante	End Cell Voltage (ECV) for Plante (V)	Number of cells per Battery bank for Plante	Mandatory spares Specification, if applicable	Name of Unit	Remarks	Temperatur e correction Factor	Capacity factor	Battery Model	Qty(Battery: Total AH (No. of cells*Batter y model* No of Battery Bank))	Unit rate Per AH	Total price (Price per AH* No. of battery bank*Total AH per bank)
1	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	SIPAT- Main plant Location	2	45	15	1.25	1.14	Refer remarks	1	1.85	Refer remarks	Not applicable (Mandatory spares scope removed)	PEM	220V, Lead acid/ Ni-Cd battery suitable for MAIN PLANT as per 'Load duty cycle' One Set => One Battery String comprising of 107/ 169 Cells. If one string is not meeting the required AH capacity, multiple (nos.) strings of 107/ 169 cells each shall be provided. The complete connectors (including inter cell, inter-row, inter- bank connectors), required to connect the "n" nos. strings shall be in bidder's scope.						
2	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	SIPAT- OFFSITE	2	45	15	1.25	1.14	169	1	1.85	107	Not applicable (Mandatory spares scope removed)	PEM	Minimum size of battery – 150AH for Lead acid plante 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.						
3	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Singrauli- Main plant Location	4	45	15	1.25	1.14	Refer remarks	1.25	1.85	Refer remarks	(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	220V, Lead acid/ Ni-Cd battery suitable for MAIN PLANT as per 'Load duty cycle' One Set => One Battery String comprising of 107/ 169 Cells. If one string is not meeting the required AH capacity, multiple (nos.) strings of 107/ 169 cells each shall be provided. The complete connectors (including inter cell, inter-row, inter- bank connectors), required to connect the "n" nos. strings shall be in bidder's scope.						
4	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Singrauli - OFFSITE	2	45	15	1.25	1.14	169	1.25	1.85	107	(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 plante 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.						
5	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Korba West - Main plant Location	4	45	15	1.25	1.14	Refer remarks	1	1.85	Refer remarks	(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	220V, Lead acid/ Ni-Cd battery suitable for MAIN PLANT as per 'Load duty cycle' One Set => One Battery String comprising of 107/ 169 Cells. If one string is not meeting the required AH capacity, multiple (nos.) strings of 107/ 169 cells each shall be provided. The complete connectors (including inter cell, inter-row, inter- bank connectors), required to connect the "n" nos. strings shall be in bidder's scope.						
6	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Korba west -OFFSITE	2	45	15	1.25	1.14	169	1	1.85	107	(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 plante 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.						
7	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Yamunanagar-Main Plant Location	2	120	5	1.25	1.14	Refer remarks	1	1.85	Refer remarks	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	220V, Lead acid/ Ni-Cd battery suitable for MAIN PLANT as per 'Load duty cycle' One Set => One Battery String comprising of 107/ 169 Cells. If one string is not meeting the required AH capacity, multiple (nos.) strings of 107/ 169 cells each shall be provided. The complete connectors (including inter cell, inter-row, inter- bank connectors), required to connect the "n" nos. strings shall be in bidder's scope.						
8	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Darlipalli - Main Plant Location	2	45	15	1.25	1.14	Refer remarks	1	1.85	Refer remarks	Not applicable (Mandatory spares scope removed)	PEM	220V, Lead acid/ Ni-Cd battery suitable for MAIN PLANT as per 'Load duty cycle' One Set => One Battery String comprising of 107/ 169 Cells. If one string is not meeting the required AH capacity, multiple (nos.) strings of 107/ 169 cells each shall be provided. The complete connectors (including inter cell, inter-row, inter- bank connectors), required to connect the "n" nos. strings shall be in bidder's scope.						
9	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Darlipalli - Water System Area	2	45	15	1.25	1.14	169	1	1.85	107	Not applicable (Mandatory spares scope removed)	PEM	Minimum size of battery – 150AH for Lead acid plante 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.						
10	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Darlipalli - FOPH Area	2	45	15	1.25	1.14	169	1	1.85	107	Not applicable (Mandatory spares scope removed)	PEM	Minimum size of battery – 150AH for Lead acid plante 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.						
11	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Darlipalli - RWPH Area	2	45	15	1.25	1.14	169	1	1.85	107	Not applicable (Mandatory spares scope removed)	PEM	Minimum size of battery – 150AH for Lead acid plante 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.						
12	Battery for Charger	NA	NA	Refer PEM Load duty cycle in Spec	Singreni - Main Plant area	2	45	15	1.25	1.14	Refer remarks	1	1.85	Refer remarks	i) Complete dry cell : 5 % or 5 no whichever is more for each set of battery bank. ii) Inter-cell connectors with hardware : 5% or 5 no whichever is more for each set of battery bank	PEM	PLANT as per 'Load duty cycle' One Set => One Battery String comprising of 107/ 169 Cells. If one string is not meeting the required AH capacity, multiple (nos.) strings of 107/ 169 cells each shall be provided. The complete						
13	Battery for Charger	NA	NA	Refer ISG Load duty cycle in Spec	2X800MW Lara- CHP	2	60	15	1.25	1.14	169	1.25	1.85	107	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						

14	Battery for Charger		NA	NA	Refer ISG Load duty cycle in Spec.	2X800MW Lara- AHP	2		30	15	1.25	1.14	169	1.25	1.85	107	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 incase of Ni-Cd battery and 150AH incase of Lead Acid battery or as per enclosed Load Cycle & Design Factors whichever is higher to be considered										
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	1.25	1.85	107	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 incase of Ni-Cd battery and 150AH incase of Lead Acid battery or as per enclosed Load Cycle & Design Factors whichever is higher to be considered										
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	1.25	1.85	107	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 incase of Ni-Cd battery and 150AH incase of Lead Acid battery or as per enclosed Load Cycle & Design Factors whichever is higher to be considered										
17	SUPERVISION OF ERECTION - BATTERY-PEM Requirement																	PEM/ISG									36		
18	COMMISSIONING OF BATTERY-PEM Requirement																	PEM/ISG									36		
19	COMMISSIONING OF BHMS-PEM Requirement																	PEM									16		
20	BHMS-PEM Requirement																(c) IBHMS Spares- 5% of installed capacity	PEM	BHMS is now not applicable for PEM -offsite and ISC requirements. Hence reduction in quantities Accordingly The costery will save 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. Intercell, inter row, inter bank connectors with connection hardware as required for complete installation plus 5% extra 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).						16				
21	Additional accessories per battery bank for ISG Banks																	ISG									8		
22	Battery for Charger				220V 0.1' - 170.27A 1.40' - 53.11A 61'-180' - 48.10A	DVC Kodierma	2		180	15	1.25	1.14			183	1.25	1.85	110	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)								
23	Battery for Charger				220V 0.1' - 210A 1.40' - 85A 61'-180' - 75A	CSPGCL Korba	2		180	15	1.25	1.14			183	1.25	1.85	110	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)								
24	Battery for Charger				48V 0.180' - 65A	CSPGCL Korba	2		180	15	1.25	1.14		40	1.25	1.85	2	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)									
25	Battery for Charger				220V 0.1' - 241A 1.40' - 100A 61'-180' - 62A	NTPC Singrauli	2		180	15	1.25	1.14			183	1.25	1.85	110	a) Complete dry cell (1 Set = 5% or 10 Nos. whichever is more,for each set of Battery Bank) - 4set- 2 set b) Inter-cell connectors with Hardware (1 Set = 5% or 5 Nos. whichever is more,for each set of Battery Bank) - 4set- 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)								
26	Battery for Charger				48V 0.180' - 59A	NTPC Singrauli	2		180	15	1.25	1.14		40	1.25	1.85	2	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)									
27	Battery for Charger				220V 0.1' - 185A 1.40' - 60A 61'-180' - 55A	SCCL Singreni	2		180	15	1.25	1.14			183	1.25	1.85	110	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)								
28	Battery for Charger				220V 0.1' - 160A 1.40' - 50A 61'-180' - 50A	HPGCL Yamuna nagar	2		120	5	1.25	1.14			183	1.25	1.85	110	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	Minimum rating indicated is 220V Battery – 500 AH Lead Acid Plante / 400 AH Ni-Cd (KPH Type).								
29	Battery for Charger				220V	GSECL Utkal	0	120							183		110		TBG	Scope deleted									
30	Battery for Charger				48V	GSECL Utkal	0	120							40		24		TBG	Scope deleted									
31	Battery for UPS	145	0.9	128888.8889	Lara- Unit	2	60	4	1.25	1.1	287	1.25	1.85	180	2 Nos. of each type and Rating	EDN													
32	Battery for UPS	150	0.9	133333.3333	Singrauli- Unit	2	60	4	1.25	1.1	287	1.25	1.85	180	2 Nos. of each type and Rating	EDN													
33	Battery for UPS	150	0.9	133333.3333	Sipat Unit	1	60	4	1.25	1.1	287	1.25	1.85	180	2 Nos. of each type and Rating	EDN													
34	Battery for UPS	160	0.9	142222.2222	Koderma Unit	2	60	4	1.25	1.1	287	1.25	1.85	180	2 Nos. of each type and Rating	EDN													
35	Battery for Charger	750			Lara- SG	4	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN													
36	Battery for Charger	800			Lara- BOP	4	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN													
37	Battery for Charger	775			Lara- Common	2	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN													
38	Battery for Charger	425			Lara- TG	4	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN													
39	Battery for Charger	713			Singrauli- SG	4	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN													
40	Battery for Charger	760			Singrauli- BOP	4	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN													
41	Battery for Charger	736			CER	2	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN													
42	Battery for Charger	404			Singrauli- TG	4	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN													
43	Battery for Charger	787			Sipat- SG	2	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN													
44	Battery for Charger	840			Sipat- BOP	2	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN													

45	Battery for Charger			447	Sisat -TG	2	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN							
46	Battery for Charger			751	Koderma -SG	4	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN							
47	Battery for Charger			797	Koderma -BOP	4	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN							
48	Battery for Charger			710	Koderma -Common	2	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN							
49	Battery for Charger			390	Koderma -TG	4	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN							
50	Battery for Charger			675	Raghunathpur -SC	4	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN							
51	Battery for Charger			720	Raghunathpur -BOP	4	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN							
52	Battery for Charger			687	Raghunathpur -Common	2	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN							
53	Battery for Charger			382	Raghunathpur -TG	4	60	4	1.25	1.16	19/38	1.25	1.85	12/24	2 Nos. of each type and Rating	EDN							
54	Erection Supervision & Commissioning Charges-TBG Requirement for 220V Batteries															TBG						10	
55	Erection Supervision & Commissioning Charges of 24V/48V Batteries-EDN/TBG Requirement															AE						66	
56	Erection Supervision & Commissioning Charges of UPS Batteries															AE						7	
57	Electrolyte															AE	Extra Electrolyte, if required					5000	
58	Battery accessories per battery bank															AE						120	

Note: 1.Changes in BOM are highlighted with yellow
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Specification Amendment

Existing clause:	Revised clause:
For Batteries, bidder shall provide unit rate in “Rs per cell per AH” for each line item as per annexure-I. BHEL shall calculate the total price of a battery bank as follows: Price per Battery Bank= (No. of cells required for UPS/Charger) X (Price in Rs per cell per Ah X (Battery Model (Ah) selected). Permissible tolerance of ordering shall be +/-15% for each line item. For batteries, total AH of Battery bank ie (Battery model) X (No. of cells) X (No.of Battery banks) and Total AH of Mandatory Spares of individual line item shall be considered for tolerance calculation. Quoted per cell per AH shall be maintained for +/-15% variation of battery model limited to nearby catalogue model of vendor. In case if a BHEL unit is ordering beyond the tolerance limit for an individual line item, the successful bidder must obtain clearance from BHEL EDN prior to accepting such purchase orders.	For Batteries, bidder shall provide unit rate in “Rs per cell per AH” for each line item as per annexure-I. BHEL shall calculate the total price of a battery bank as follows: Price per Battery Bank= (No. of cells required for UPS/Charger) X (Price in Rs per cell per Ah X (Battery Model (Ah) selected). Permissible tolerance of ordering shall be +/-10% for each line item. For batteries, total AH of Battery bank ie (Battery model) X (No. of cells) X (No.of Battery banks) and Total AH of Mandatory Spares of individual line item shall be considered for tolerance calculation. Quoted per cell per AH shall be maintained for +/-10% variation of battery model limited to nearby catalogue model of vendor. If the revised model is already available in the RC within a group (Group as defined below), then the price already provided by bidder for the revised model will be used for ordering. For this purpose, Batteries for 24V & 48V will be considered as one GROUP-I and Batteries for 220V & Batteries of UPS will be considered as GROUP-II In case if a BHEL unit is ordering beyond the tolerance limit for an individual line item, the successful bidder must obtain clearance from BHEL EDN prior to accepting such purchase orders.