1X200 MW + 1X210MW GSECL UKAI TG R&M

TECHNICAL SPECIFICATION
FOR
DC Lead Acid/ Ni-Cd Battery

SPECIFICATION No. **PE-TS-499-508-E001**
ISSUE NO. 01
REV NO. 0

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, INDIA

BHEL	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 1X200 MW + 1X210MW GSECL UKAI TG R&M	PE-TS-499-508-E001 Issue No: 01 Rev. No. 00 Date : 17.09.2025

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BHEL	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 1X200 MW + 1X210MW GSECL UKAI TG R&M	PE-TS-499-508-E001 Issue No: 01 Rev. No. 00 Date : 17.09.2025

SCOPE

SCOPE OF THIS PACKAGE COVERS THE FOLLOWING:

SL.NO	PARAMETERS	REQUIREMENT
1	Supply Including Design, Engineering, Manufacturing of DC Lead Acid Battery	YES
a)	Main Supply	YES
b)	Commissioning Spares	NO
2	Painting	YES
3	Inspection & Testing	YES
4	Packing	YES
5	Transportation & Delivery To Site	YES
6	Erection & Commissioning	NO
7	Supervision of Erection & Commissioning	YES
8	Mandatory Spares	NO
9	O & M Service	NO
10	O & M Spares	NO

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	GENERAL TECHNICAL REQUIREMENT
1.0	It is not the intent to specify herein all the details of design and manufacturing. Bidder shall ensure that the offered equipment confirms in all respects to high standards of design, engineering and workmanship.
2.0	Bidder shall also ensure that the offered equipment shall comply with all applicable statutory and regulatory requirements.
3.0	In the event of any conflict between the requirements of two clauses of this specification, documents or requirements of different codes and standards specified, however more stringent requirement as per the interpretation of the owner shall apply.
4.0	Bidder to note that drawing/document submission shall be through web based Document Management System. Bidder would be provided access to the DMS for drg/doc approval and training for the same. Bidder to ensure proper internet connectivity at their end.
5.0	The first revision drawings/ documents submitted by vendor shall be complete in all respects.Any incomplete drawing submitted shall be treated as non- submission with delays attributable to vendor's account. For any clarification/ discussion required to complete the drawings, the bidder shall himself depute his personal to BHEL / Customer's place any number of time as per the requirement for across the table discussions/ finalizations/ submissions of drawings.
6.0	Latest codes and standards shall be complied with.
7.0	Bidder shall furnish Type Test Certificate of specified Type Test as per quality plan which has been conducted within period of **7** years from the date of techno-commercial bid opening. These reports should be for the tests conducted on the battery similar to those proposed to be supplied under this contract and test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client. However, BHEL reserves the right to waive conducting of any or all the specified type test(s) under this contract. However, if the contractor is not able to submit report of the type test(s) conducted within last **7** years from the indicated date, or in the case of type test report(s) are not found to be meeting the specification requirements, the contractor shall conduct all such tests under this contract at no additional cost and time implication to the BHEL either at third party lab or in presence of client/owners representative and submit the reports for approval
8.0	Bidder shall submit stamped QP on compliance route in the event of order. In case, the bidder is supplying the item from outside India, the third party inspection shall be arranged and considered by the bidder in their offer.
9.0	**LAYOUT CONSIDERATIONS:**
9.1	The Battery will be located in battery rooms on wooden rack properly treated for acid resistance for Lead Acid battery; or on steel rack with alkali-resistance powder for Ni-Cd battery. Chargers / DCDB will be located in separate room.
9.2	Equipment must be safe, reliable and easy to maintain at all operating condition

9.3	1. Supplier to give the following undertaking in the BOM: "The BoM provided herewith completes the scope (in content and intent) of material supply under PO No. ----------, dated ----------. Any additional material which may become necessary for the intended application of the supplied item(s)/package will be supplied free of cost in most reasonable time." 2. Supplier to also give the following undertaking in the Packing List: "The Packing List provided herewith is as per the BoM approved under PO No.---------, dated ---------."

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TECHNICAL DATA - PART - A (LEAD ACID)

SL.NO	DESCRIPTION	UOM	DETAIL
1.0	**DESIGN CODES & STANDARDS**		
1.1	Battery		a) IS:1652 b) IEC-60896-11 c) BS-6290 d) IS-8320 e) Indian Electricity Rules f) Indian Electricity Acts g) IS : 3116
1.2	Battery Sizing		IEEE-485
1.3	Water and Sulfuric Acid		IS-1069 and IS-266
1.4	Separators		IS-6071
1.5	Containers		IS-1146
2.0	**DESIGN /SYSTEM PARAMETERS**		
2.1	Ambient air temperature	Deg. C	50
2.2	Min Electrolyte temperature	Deg. C	5
2.3	Rated Voltage	Volts	220V DC
2.4	No. of Cells	Nos.	107
2.5	Type of Battery		Lead Acid Plante high discharge
2.6	Discharge / Nominal Float Voltage per Cell	Volts	2 / 2.25
2.7	End Cell Voltage	Volts	1.85
2.8	Tapping to be provided in battery		NO
3.0	**CONSTRUCTION FEATURES**		
3.1	MATERIAL AND TYPES OF PLATES		
3.1.1	Positive Plates		
	a) Material		99.99% Pure Lead
3.1.2	Negative Plates		
	a) Material		Lead - Antimony alloy grid
3.2	ELECTROLYTE		
3.2.1	Material		Battery Grade Sulfuric Acid
3.2.2	Recommended Specific Gravity at 27 Deg.C		
	a) At Full Charger		1.215 +/- 0.005
3.2.3	Permissible max. temperature of Electrolyte		
	a) During Initial Charging	Deg. C	50
3.3	CONTAINER		
3.3.1	Material		Transparent Styrene Acrylonitrile (SAN)/ FRP

3.3.2	Type		Heat resistant, leak proof, non-absorbent, acid resistant, non-bulging type and free from flaws such as wrinkles, cracks, blisters, pinholes etc
3.3.3	Marking for Electrolyte		Upper & lower limits of Electrolyte to be marked
3.3.4	Sediment Space		As per IS:1652/ manufacturer practice (Bidder to furnish required documents for provenness)
3.4	COVER/CELL LIDS		
3.4.1	Type of Cover		Adhesive Sealed
3.4.2	Material of Cover		Opaque Styrene Acrylonitrile (SAN) or ABS Plastic
3.4.3	Type of Sealing compound		Non-Cracking Type
3.5	VENTING DEVICE		
3.5.1	Type of Vent		Anti-Splash type with More than one exit hole to allow the gases to escape freely but prevent the acid spray from the battery
3.5.2	Material		Explosion Proof Microporous Ceramic Made
3.5.3	Other Feature		Design shall be such that the water loss due to evaporation is kept to minimum and dimensions shall be such that the syringe type hydrometer can be inserted into the vent to take electrolyte sample.
3.6	SEPARATORS		
3.6.1	Type		Stable for continuous immersion in the electrolyte without distortion and shall maintain the electrical insulation between the plates and shall permit free flow of electrolyte
3.7	INTER CELL, INTER ROW & INTER TIER/BANK CONNECTORS		
3.7.1	Material of inter cell Connectors		Lead Plated/Coated Copper connectors
3.7.2	Material of inter row/ Bank Connectors		Flexible PVC insulated Copper cable/Connector

3.7.3	Material of Both, Nuts and Washer		Brass (Lead Coated) / Stainless Steel
3.8	BATTERY RACKS		
3.8.1	Material of Rack		Wooden rack properly treated for acid resistance
3.8.2	Arrangement of batteries on racks		Single tier for batteries having cell weight 50kg or more.
3.8.3	Antirodent and Termite properties for Wooden racks ?		YES
3.8.4	Rack Insulators Material		Porcelain/Hard rubber/ PVC Pad
3.9	CABLE CONNECTION & LUGS		
3.9.1	Cable size from terminal take-off board to Fuse/MCCB Box		Cable size shall be informed during detailed engineering.
3.9.2	Cable supply Scope		
	Cables from terminal take-off/Board to Fuse/MCCB Box		BHEL
	Internal copper cables/ Connector between battery and up to terminal take-off/Board		Bidder
3.9.3	Cable Lugs supply scope as per Cable Size		Bidder
3.9.4	Supply scope of Support Equipment/Material for termination of cable at bettery end		Bidder
3.10	MARKING/DESIGNATION ON CELL		As per IS-1652/IEC-60896-11
3.11	INSTRUCTION CARDS		
3.11.1	Information on Instruction Card		As per IS-1652/IEC-60896-11
4.0	**PERFORMANCE PARAMETERS**		
4.1			Not Applicable
5.0	**INSPECTION/TESTING**		
5.1	Type Test		Refer sl. no. 7 of 'General Technical requirements'

5.2	Routine and Acceptance Test		All acceptance and routine tests as per Quality Assurance plan (QP no. PE-QP-999-508-E002) shall be carried out. Charges for these shall be deemed to be included in the equipment price.
6.0	Capacity for ten(10)hour rate		As per requirement

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TECHNICAL DATA - PART - A (NI-CD)

SL.NO	DESCRIPTION	UOM	DETAIL
1.0	**DESIGN CODES & STANDARDS**		
1.1	Battery		a) IS:10918 b) IEC-60623 c) IS-8320 e) Indian Electricity Rules f) Indian Electricity Acts g) IS : 3116
1.2	Battery Sizing		IEEE-1115
1.3	Electrolyte		IS-6831/IEC-60993
1.4	Separators		IS:10918
1.5	Containers		IS-10918
1.6	Connectors		IS-1897/IS-191
2.0	**DESIGN /SYSTEM PARAMETERS**		
2.1	Ambient air temperature	Deg. C	50
2.2	Min Electrolyte temperature	Deg. C	5
2.3	Rated Voltage	Volts	220V DC
2.4	No. of Cells	Nos.	169
2.5	Type of Battery		Ni-Cd high discharge
2.6	Discharge / Nominal Float Voltage per Cell	Volts	1.2 / 1.42
2.7	End Cell Voltage	Volts	1.14
2.8	Tapping to be provided in battery		NO
3.0	**CONSTRUCTION FEATURES**		
3.1	TYPES OF PLATES		
3.1.1	Positive Plates		High Discharge Type (KPH)
3.1.2	Negative Plates		High Discharge Type (KPH)
3.2	ELECTROLYTE		
3.2.1	Material		Solution of LIOH/KOH in distilled water
3.2.2	Recommended Specific Gravity at 27 Deg.C		
	a) At Full Charger		1.2 +/- 0.01
3.2.3	Permissible max. temperature of Electrolyte		
	a) During Initial Charging	Deg. C	50
3.3	CONTAINER		
3.3.1	Material		Translucent Plastic-Polyproplene/ FRP

3.3.2	Type		Heat resistant, leak proof, non-absorbent, alkali resistant, non-bulging type and free from flaws such as wrinkles, cracks, blisters, pinholes etc
3.3.3	Marking for Electrolyte		Upper & lower limits of Electrolyte to be marked
3.3.4	Sediment Space		Sufficient sediment space shall be provided beneath the plates to accommodate any plate deposit, which accumulates at the bottom of the cell over a reasonable life of battery without short-circuiting the plates
3.4	COVER/CELL LIDS		
3.4.1	Type of Cover		Closed/Sealed
3.4.2	Material of Cover		Polyproplene
3.4.3	Type of Sealing compound		Non-Cracking Type
3.5	VENTING DEVICE		
3.5.1	Type of Vent		Anti-Splash type with More than one exit hole to allow the gases to escape freely but prevent the alkali spray from the battery
3.5.2	Other Feature		Design shall be such that the water loss due to evaporation is kept to minimum and dimensions shall be such that the syringe type hydrometer can be inserted into the vent to take electrolyte sample.
3.6	SEPARATORS		
3.6.1	Type		Stable for maintaining the electrical insulation between the plates and shall permit free flow of electrolyte. Separator between plates of the cells shall be porous alkali resistant and have insulating capacity to avoid shorting or leakage of current between the plates of opposite polarity
3.7	INTER CELL, INTER ROW & INTER TIER/BANK CONNECTORS		

3.7.1	Material of inter cell/ Block Connectors		Nickel Plated/Coated Copper connector
3.7.2	Material of inter row/ Bank Connectors		Flexible PVC insulated Copper cable/Connector
3.7.3	Material of Both, Nuts and Washer		Stainless Steel/Mild Steel
3.8	BATTERY RACKS		
3.8.1	Material of Rack		Mild Steel with alkali resitance.
3.8.2	Arrangement of batteries on racks		As per supplier recommendation/ suiting layout
3.8.4	Rack Insulators Material		Porcelain/Hard rubber/ PVC Pad
3.9	CABLE CONNECTION & LUGS		
3.9.1	Cable size from terminal take-off board to Fuse/MCCB Box		Cable size shall be informed during detailed engineering.
3.9.2	Cable supply Scope		
	Cables from terminal take-off/Board to Fuse/MCCB Box		BHEL
	Internal copper cables/ Connector between battery and up to terminal take-off/Board		Bidder
3.9.3	Cable Lugs supply scope as per Cable Size		Bidder
3.9.4	Supply scope of Support Equipment/Material for termination of cable at bettery end		Bidder
3.10	MARKING/DESIGNATION ON CELL		As per IS-10918/IEC-60623
3.11	INSTRUCTION CARDS		
3.11.1	Information on Instruction Card		As per IS-10918/IEC-60623
4.0	**PERFORMANCE PARAMETERS**		
4.1			Not Applicable
5.0	**INSPECTION/TESTING**		
5.1	Type Test		Refer sl. no. 7 of 'General Technical requirements'

5.2	Routine and Acceptance Test		All acceptance and routine tests as per Quality Assurance plan (QP no. PE-QP-999-508-E004) shall be carried out. Charges for these shall be deemed to be included in the equipment price.

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TECHNICAL DATA - PART - B (SUPPLIER DATA TO BE FURNISHED AFTER AWARD OF CONTRACT)

SL.NO	DESCRIPTION	UOM	DETAIL
1.0	**GENERAL PARTICULARS**		
1.1	Make of Battery		
1.2	Type of Cell		
1.3	IS Nomenclature		
1.4	Nominal Float Voltage per Cell	Volts	
1.5	Capacity of Battery(As per Load Duty cycle, Temp correction factor & Design Margin)	AH	
1.6	No. of Battery Bank in Parallel	Nos.	
1.7	Expected life of battery under normal operation & maintenance conditions	Years	
1.8	Efficiency		
1.8.1	Ah efficiency	%	
1.8.2	Watt Hr efficiency	%	
1.9	Storage		
1.9.1	Recommended Max. period of cell storage before the first Charge (After Installation and filling of Electrolyte)	Hrs.	
1.9.2	Recommended Storage life of Battery (Dry shelf life)	Years	
1.10	Ventilation Requirements		
1.10.1	Gas generation per single cell per hour	Litre	
1.10.2	Gas generation for 1 set battery	Litre	
1.10.3	No. of air exchanges required per hour	cubic mt./hour	
1.11	Resistance of Battery		
1.11.1	Internal resistance of Each Cell at fully charged condition	m-ohms	
1.11.2	Internal resistance of Each Cell at fully discharged condition	m-ohms	
1.11.3	Internal resistance of Each Battery at fully charged condition	m-ohms	
1.11.4	Internal resistance of Each Battery at fully discharged condition	m-ohms	
1.12	Short Circuit Current		
1.12.1	At Battery terminal during float charging	kA	
1.12.2	At Battery terminal during boost charging	kA	
1.12.3	Time for which battery can withstand short circuit at terminals	Sec	

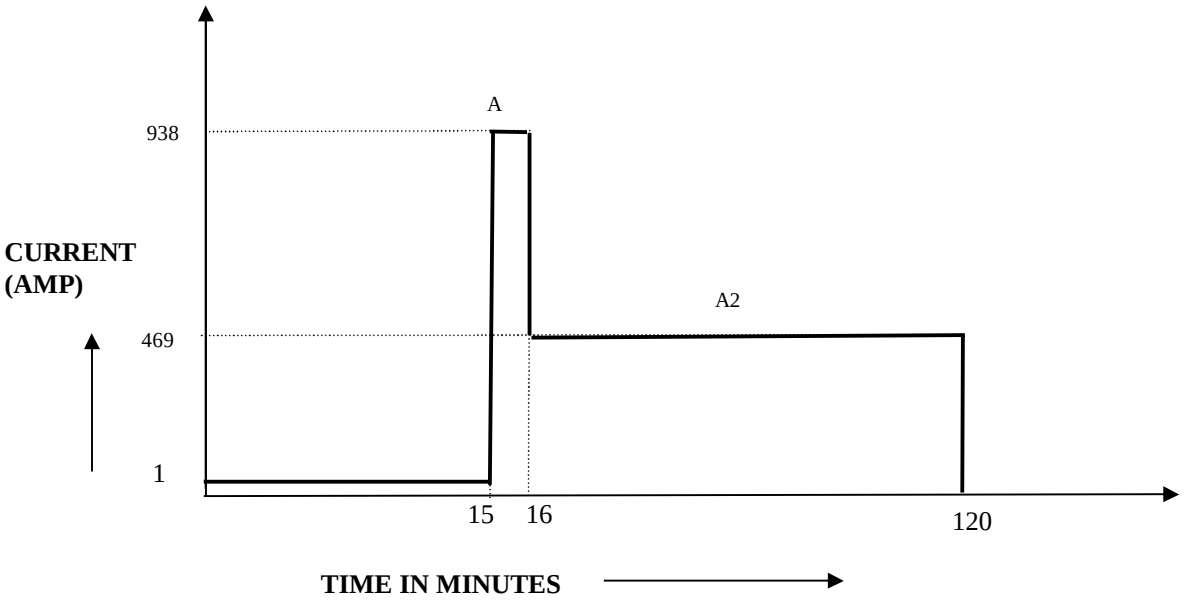
2.0	**BATTERY CAPACITY AND DISCHARGE CURRENT**		
2.1	Declared Capacity at 27 deg. C upto ECV		
	Initial	AH	
	Rated	AH	
	End of Life	AH	
2.2	Battery Discharge Current at various duration at ECV		
	5 Minute	Amps	
	30 Minute	Amps	
	1 Hr.	Amps	
	10 Hr.	Amps	
2.3	Loss in capacity in 28 days due to self-discharge	%	
3.0	**RECOMMENDED CHARGING RATE FOR**		
3.1	Float Charging		
	Limit Current	Amps	
	Voltage per cell	Volts	
3.2	Boost Charging		
	Starting Current	Amps	
	Finishing current	Amps	
	Voltage	Volts	
3.3	Trickle Charging		
	Minimum	mA	
	Maximum	mA	
3.4	Equalising Charge		
	Voltage	Volts	
	Current	Amps	
	Duration	Hrs	
	Interval between successive equalising charge	Months	
4.0	**CONSTRUCTION FEATURES**		
4.1	MATERIAL AND TYPES OF PLATES		
4.1.1	Positive Plates		
	a) Height of Positive Plate	mm	
	b) Thickness of Positive Plate	mm	
	c) No. of Positive Plates	Nos.	
4.1.2	Negative Plates		
	a) Height of Negative Plate	mm	
	b) Thickness of Negative Plate	mm	

	c) No. of Negative Plates	Nos.	
4.1.3	Clearance between bottom of the plate and the bottom of the container	mm	
4.1.4	Clearance between top of the plate and top of the container	mm	
4.2	ELECTROLYTE		
4.2.1	Recommended Specific Gravity at 27 Deg.C		
	a) For First Filling		
	b) At Full Charger		
	c) When Battery is discharged at 10 hours rate		
4.2.2	Permissible max. temperature of Electrolyte		
	a) Permissible max. temperature of Electrolyte	Deg. C	
4.2.3	Quantity of Electrolyte per cell	Litre	
4.2.4	Quantity of Electrolyte for battery (Including 10% extra)	Litre	
4.3	CONTAINER		
4.3.1	Thickness	mm	
4.3	SEPARATORS		
4.3.1	Material		
4.3.2	Thickness	mm	
4.4	INTER CELL, INTER ROW & INTER TIER/BANK CONNECTORS		
4.4.1	Thickness of Inter-Cell Connectors	mm	
4.4.2	Thickness of Inter-Row Connectors	mm	
4.4.3	Thickness of Inter-Tier/Bank Connectors	mm	
4.5	BATTERY RACKS		
4.5.1	No. of racks per battery	Nos.	
4.5.2	No. pf cells on each rack	Nos.	
4.5.3	Dimensions of the racks	LXWXH (mm)	
4.6	OVERALL DIMENSION		
4.6.1	Each Cell	LXWXH (mm)	
4.6.2	Battery Set	LXWXH (mm)	
4.6.3	Distance Between Cell centres	mm	
4.7	WEIGHTS		
4.7.1	Each Cell		
	a) Without Acid/ Electrolyte	Kgs.	
	b) With Acid/ Electrolyte	Kgs.	
4.7.2	Complete 1 Set of Battery		
	a) Without Acid/ Electrolyte	Kgs.	
	b) With Acid/ Electrolyte	Kgs.	

COMPLIANCE DRAWINGS

LOAD DUTY CYCLE

220V DC SYSTEM LOAD DUTY CYCLE



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

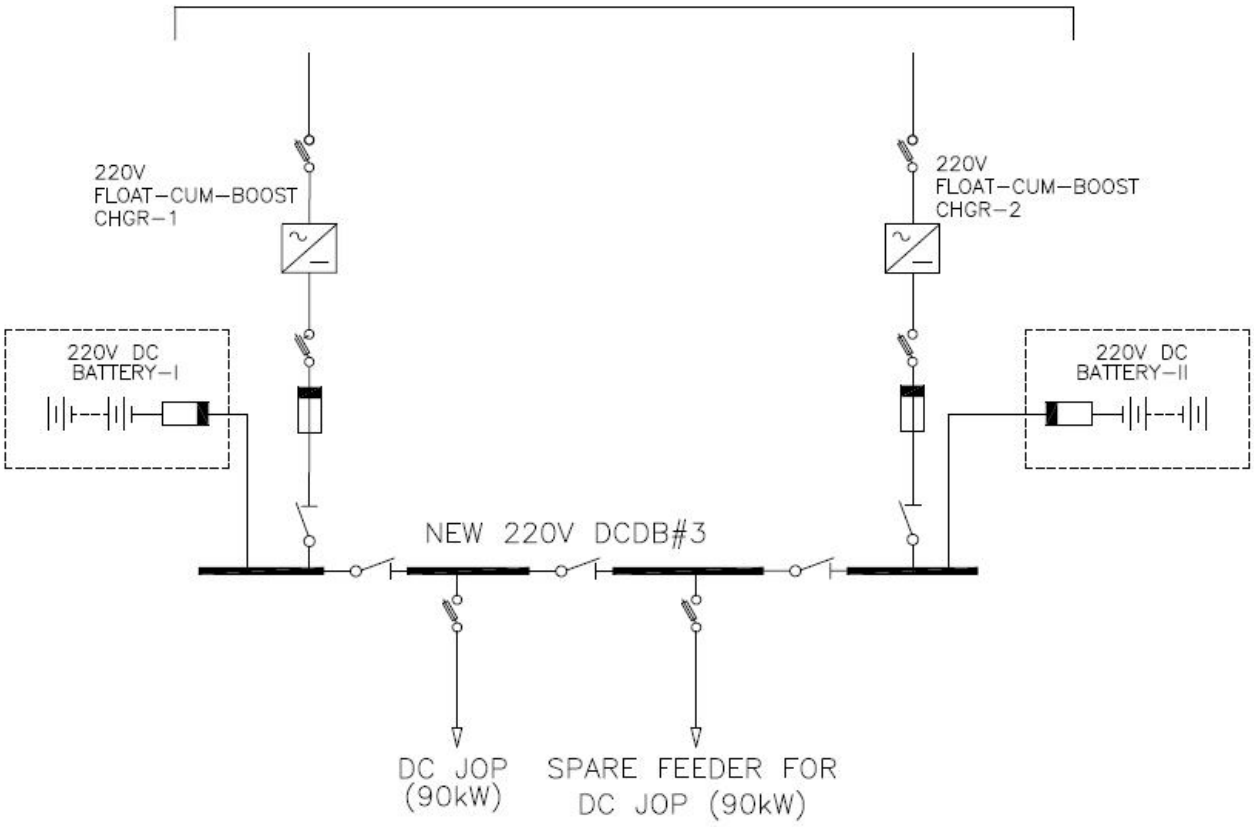
1. AGEING FACTOR : 1.1 (for Lead Acid)/ (1.25 for Ni-Cd)
2. DESIGN MARGIN : 1.20 (for Lead Acid)/ (1.20 for Ni-Cd)
3. MIN.ELECTROLYTIC TEMP. : 5 °C
4. END CELL VOLTAGE : 1.85V (for Lead-Acid Plante) & 1.14V (for Ni-Cd) PER CELL
5. TEMPERATURE CORRECTION FACTOR: As per manufacturer's data (For Lead Acid Plante B Battery, temperature correction factor shall be as per IEEE-485).

Note:

i) Bidder has to take ageing factor & design margin in their battery sizing calculation for Ni-CD battery/ LEAD Acid Battery. No deviation is acceptable on ageing factor and design margin.

CONNECTION DIAGRAM OF BATTERY, DCDB, CHARGER

ONE LINE DIAGRAM FOR 220V DC SYSTEM FOR JOP -



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QUALITY PLAN

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER			QP NO.:-PE-QP-999-508-E002, REV.02	DATE:- 27/02/2024
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- DC LEAD ACID BATTERY	SYSTEM:- DC SYSTEM		SECTION:-	SHEET 1 OF 3

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D *	10			11
					M	B/C					**			
											M	B	C	
1.0	**RAW MATERIALS & BOUGHT OUT ITEMS**													
1.1	(Pure Lead for Pos. plate, Lead Alloy for Neg. plate & Sulphuric acid)	Chemical	MA	Chemical Analysis	Random Sample	-	IS:1652, IS:266, IS:1069 & MFR's Std.	IS:1652, IS:266, IS:1069 & MFR's Std.	Test Cert.	√	P	V	V	
1.2	**SEPARATOR**													
a)	Chemical	Chemical	MA	Chemical	Random Sample	-	(For Synthetic IS : 6071)	(For Synthetic IS : 6071)	-do-	√	P	V	-	
b)	Electrical Resistance Test	Electrical	MA	Electrical	Random Sample	-	-do-	-do-	-do-	√	P	V	-	
c)	Acceptance test Dimension, Volume Porosity, Wettability of separator	Test	MA	Test	Random Sample	-	-do-	-do-	-do-	√	P	V	-	
1.3	**CONNECTOR**													
a)	Dimension	Dimension	MA	Measurement	Random Sample	-	IS:1652 & Appd. Drg./Doc.	IS:1652 & Appd. Drg./Doc.	Test Cert.	√	P	V	V	
b)	Thickness of lead coating	Thickness	CR	Measurement	Random Sample	-	-do-	-do-	-do-	√	P	V	V	
1.4	**VENT CAP**													
a)	Dimensional Conformance	Dimension	MA	Measurement	Random Sample	-	IS:1652 & Appd. Drg./Doc. Also Refer Remarks#	IS:1652 & Appd. Drg./Doc. Also Refer Remarks#	Test Cert.	√	P	V	V	*# Vent cap shall be easily removed from topping up the cells and of such dimensions that the syringe type hydrometer can be inserted into vent to take electrolyte sample.*
1.5	**CONTAINER**													
a)	Verification Constructional requirement	Visual	MA	Visual	Sample Plan as per IS:1146	-	IS:1652, IS:1146, IS:8320	IS:1652, IS:1146, IS:8320	Test Cert.	√	P	V	-	

BHEL						BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGGINEERING			QUALITY			Sign & Date		Doc No.			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared By		Kanhaiya Kumar	Prepared By		Kundan Prasad			Reviewed By			
Checked By		Ayan Saha	Checked By		Harish Kumar			Checked By			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER			QP NO.:-PE-QP-999-508-E002, REV.02	DATE:- 27/02/2024
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- LEAD ACID BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 2 OF 3

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D *	10			11
					M	B/C					**			
											M	B	C	
b)	Verification of Markings	Visual	MA	Visual	-do-	-	-do-	-do-	-do-	√	P	V	-	
c)	High Voltage Test	Electrical	MA	Electrical	-do-	-	-do-	-do-	-do-	√	P	V	-	
d)	Drops Ball Test	Mechanical	MA	Mechanical	-do-	-	-do-	-do-	-do-	√	P	V	-	
e)	Plastic Yield Test	Mechanical	MA	Mechanical	-do-	-	-do-	-do-	-do-	√	P	V	-	
f)	Acid Resistance Test	Chemical	MA	Chemical	-do-	-	-do-	-do-	-do-	√	P	V	-	
g)	Hydraulic thrust enduarnce test	Physical	MA	Physical	-do-	-	-do-	-do-	-do-	√	P	V	-	
2.0	**FINISHED BATTERY**	Routine Test	CR	Electrical & Measurement	100%	100%	IS:1652 & IS:8320	IS:1652 & IS:8320	Inspection Report	√	P	V	V	
	Note: Before Start of Inspection, Manufacturer Internal Inspection Record(QC) of the offered Batteries to be Verified													
3.0	**FINAL INSPECTION**													
3.1	**Type Test ##**													
a)	Verification Constructional requirement	Visual	MA	Visual	Sample as per IS: 8320/IS:1652	Sample as per IS: 8320/IS:1652	IS:1652	IS:1652	Inspection Report	√	P	W	W	
b)	Verification of Markings	Visual	MA	Visual	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
c)	Verification of Dimensions	Dimension	MA	Measurement	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
d)	Test for Capacity & Voltage during discharge	Test	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	Type Test report	√	P	V	V	*# # Conduction of Type Tests from S.No. (d) to (j) shall be as per Annexure-A enclosed.* *If Conduction of Type test is required as per Ann-A, then Same shall be Witnessed ('W') by BHEL/Customer in place of Verification('V') under column 'B' and 'C' of AGENCY(10) Above.*
e)	AH & WH efficiency Test	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	V	V	
f)	Test for loss of capacity on storage	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	V	V	
g)	Endurance Test	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	V	V	
h)	Loss of water test	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	V	V	
i)	Test for suitability for Floating Battery Operation	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	V	V	
j)	Internal Resistance and Short Circuit Test	-do-	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	V	V	

BHEL						BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGGINEERING			QUALITY			Sign & Date		Doc No.			
	Sign & Date	Name		Sign & Date	Name				Sign & Date	Name	Seal
Prepared By		Kanhaiya Kumar	Prepared By		Kundan Prasad	Seal		Reviewed By			
Checked By		Ayan Saha	Checked By		Harish Kumar			Checked By			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER			QP NO.:-PE-QP-999-508-E002, REV.02	DATE:- 27/02/2024
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- LEAD ACID BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 3 OF 3

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D *	10			11
					M	B/C					**			
											M	B	C	
3.2	**Acceptance Test**													
a)	Verification of Markings	Visual	MA	Visual	Sample Plan as per IS: 8320	Sample Plan as per IS: 8320	IS:1652	IS:1652	Inspection Report	√	P	W	W	
b)	Verification of Dimensions	Dimension	MA	Measurement	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
c)	Test for Capacity	Capacity	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
d)	Test for Voltage during discharge	Voltage during discharge	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
4.0	**Battery Racks**	Visual & Dimension	MA	Visual & Dimension	1 Sample	1 Sample	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	V	
5.0	**Accessories**	Visual & Dimension	MA	Visual & Dimension	100%	100%	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	-	
6.0	**Cable Lugs and Terminal Plate**	Visual	MA	Visual	100%	100%	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	-	
7.0	**Packing**	Verification of Packing Methods, Finish & Completeness	MA	Visual	100%	100%	Approved drg/ doc/ As Per Manufacturer Std./ Approved Packing drg/ doc($$)	Approved drg/ doc/ As Per Manufacturer Std./ Approved Packing drg/ doc($$)	-do-	√	P	W	-	($$)- Approved Packing Drg./ Doc Applicable for Export Job/Projects

NOTES:-

1.Wherever IS standard is mentioned, equivalent IEC/International standard is also acceptable as per applicability of test. In case of any technical requirement not covered by IEC, technical requirement as per IS shall prevail. Latest revision/year of issue of all the IS/IEC standard indicated in QAP shall be reffered.

LEGEND :-

***** RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,

**** M:** SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **B**: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **C:** CUSTOMER

P: PERFORM**, W:** WITNESS**, V:** VERIFICATION**,** AS APPROPRIATE

MA: MAJOR**, MI:** MINOR**, CR:** CRITICAL, **D**: DOCUMENTATION

BHEL						BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGGINEERING			QUALITY			Sign & Date		Doc No.			
	Sign & Date	Name		Sign & Date	Name				Sign & Date	Name	Seal
Prepared By		Kanhaiya Kumar	Prepared By		Kundan Prasad	Seal		Reviewed By			
Checked By		Ayan Saha	Checked By		Harish Kumar			Checked By			

ANNEXURE-A

QUALITY PLAN
STANDARD QP NO. : PE-QP-999-508-E002, REV. 02

LIST OF TYPE TEST FOR LEAD ACID BATTERY

S No	Test	Type test description	Referred standard	Type Test to be specifically conducted (Yes/No)	BHEL/Customer's approval/Review Req. on test certificate (Yes/No)
1	Type Test	• Test for Capacity & Voltage during discharge	IS:1652		
		• AH & WH efficiency Test	IS:1652		
		• Test for loss of capacity on storage	IS:1652		
		• Endurance Test	IS:1652		
		• Loss of water test	IS:1652		
		• Test for suitability for floating battery operation	IS:1652		
		• Internal resistance and short circuit test	IS:1652		

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER			QP NO.:-PE-QP-999-508-E004, REV.03	DATE:-27/02/2024
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- DC NI-CD BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 1 OF 4

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D *	AGENCY **			REMARKS
					M	B/C					M	B	C	
1	2	3	4	5	6		7	8	9		10			11
1.0	**RAW MATERIALS & BOUGHT OUT ITEMS**													
1.1	**CELL CONTAINER**													
a)	Dimensional & Constructional Conformance	Visual	MA	Measurement	Sampling as per IS-2500(1)-2000, S-3 Level	-	IS-10918/ Manufacturer's Drg./ Std.	IS-10918/ Manufacturer's Drg./ Std.	Inspection Report	√	P	V	-	
b)	Ball Drop Test	Mechanical	MA	Mechanical	1 Sample/Batch	-	IS-1146/ Manufacturer's Drg./ Std.	IS-1146/ Manufacturer's Drg./ Std.	Manufacturer's TC	√	P	V	-	
c)	Hydraulic Thrust Endurance Test	Physical	MA	Physical	1 Sample/Batch	-	-do-	-do-	-do-	√	P	V	-	
d)	Resistance to Alkali	Chemical	MA	Chemical	1 Sample/Batch	-	-do-	-do-	-do-	√	P	V	-	
e)	HV Test	Electrical	MA	Electrical	3 Sample/Batch	-	-do-	-do-	-do-	√	P	V	-	
f)	Shade Difference, Straightness of Side Walls, Free from Burrs, Flash lines etc.	Visual	MA	Visual	100%	-	-	Free From Visual Defects	Inspection Report		P	-	-	
1.2	**CONNECTOR**													
a)	Material Conformance	Chemical	CR	Chemical	1 Sample/Batch	-	As per IS-1897/ IS-191	As per IS-1897/ IS-191	Manufacturer's TC	√	V	V	V	External Report
b)	Dimensional Conformance	Visual	MA	Measurement	Sampling as per IS-2500(1)-2000, 2.5%AQL	-	Approved drg/ doc & Manufacturer's Std.	Approved drg/ doc & Manufacturer's Std.	Inspection Report	√	P	V	V	
c)	Visual Defects	Visual	MA	Visual	100%	-	-	Free From Visual Defects & Burrs	-do-	√	P	V	V	
d)	Plating Quality (Duplex)	Physical/ Visual	CR	Visual & Thickness	Sampling as per IS-2500(1)-2000, S-3 Level	-	Manufacturer's Drg./ Std.	Manufacturer's Drg./ Std.	Manufacturer's TC	√	P	V	V	External Report
1.3	**SEPARATOR**													
a)	Dimensional Conformance	Visual	MA	Measurement	Sampling as per IS-2500(1)-2000, S-3 Level	-	IS-10918/ Manufacturer's Drg./ Std.	IS-10918/ Manufacturer's Drg./ Std.	Inspection Report	√	P	V	-	

BHEL						BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGGINEERING			QUALITY			Sign & Date		Doc No.			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared By		Kanhaiya Kumar	Prepared By		Kundan Prasad			Reviewed By			
Checked By		Ayan Saha	Checked By		Harish Kumar			Checked By			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER			QP NO.:-PE-QP-999-508-E004, REV.03	DATE:-27/02/2024
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- DC NI-CD BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 2 OF 4

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D *	10			11
					M	B/C					**			
											M	B	C	
b)	Colour shade difference, burrs, flash at the edge	Visual	MA	Visual	Sampling as per IS-2500(1)-2000, S-3 Level	-	-	Free From Visual Defects	-do-		P	-	-	
1.4	**VENT CAPS**													
a)	Dimensional Conformance	Visual	MA	Visual & Measurement	Sampling as per IS-2500(1)-2000, S-3 Level	-	-	Refer Remarks#	Inspection Report	√	P	V	V	*# Vent cap shall be easily removed for topping up the cells and of such dimensions that the syringe type hydrometer can be inserted into vent to take electrolyte sample.*
1.5	**RUBBER COMPONENTS (GASKETS & SEALING RING ETC)**													
a)	Material Quality	Physical	CR	Shore Hardness	1 Sample/Lot	-	Manufacturer's Drg./ Std.	Manufacturer's Drg./ Std.	Inspection Report	√	P	V	-	
b)	Resistance to alkali & oil	Chemical	MA	Chemical	3 Sample/Lot	-	-do-	-do-	Manufacturer's TC	√	P	V	-	External Report
c)	Dimensional Conformance	Visual	MA	Measurement	Sampling as per IS-2500(1)-2000, S-3 Level	-	-do-	-do-	Inspection Report	√	P	V	-	
d)	Flash or burrs	Visual	MA	Visual	100%	-	-	Free from Defects	-do-		P	-	-	
2.0	**FINISHED BATTERY**													
	Note: Before Start of Inspection, Manufacturer Internal Inspection Record(QC) of the offered Batteries to be Verified													
2.1	**ROUTINE TEST**													
a)	Physical Examination	Visual	MA	Visual	Sampling as per IS-8320	Sampling as per IS-8320	IS:10918 & IS:8320	IS:10918 & Approved drg/ doc	Inspection Report	√	P	V	V	
b)	Dimension, Mass and Layout	Dimension & Visual	MA	Measurement & Visual	-do-	-do-	Approved drg/ doc	-do-	-do-	√	P	V	V	

BHEL						BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGGINEERING			QUALITY			Sign & Date		Doc No.			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared By		Kanhaiya Kumar	Prepared By		Kundan Prasad			Reviewed By			
Checked By		Ayan Saha	Checked By		Harish Kumar			Checked By			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER			QP NO.:-PE-QP-999-508-E004, REV.03	DATE:-27/02/2024
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- DC NI-CD BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 3 OF 4

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
1	2	3	4	5	6		7	8	9	D *	10			11
					M	B/C					**			
											M	B	C	
c)	Cell Marking	Visual	MA	Visual	100%	100%	-do-	-do-	-do-	√	P	V	V	
d)	Polarity & Absence of Short Circuit	Electrical	MA	Electrical	100%	100%	IS:10918	-do-	-do-	√	P	V	V	By Voltage Meas. accordingly to Polarity
2.2	**TYPE TEST # #**													
a)	Physical Examination	Visual	MA	Visual	Sampling as per IS-8320/IS-10918	Sampling as per IS-8320/IS-10918	IS:10918 & Approved drg/ doc	IS:10918 & Approved drg/ doc	Type Test Report	√	P	W	W	
b)	Dimensions, Mass & Layout	Dimension & Visual	MA	Measurement & Visual	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
c)	Cell Marking	Visual	MA	Visual	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
d)	Polarity & absence of short circuit	Electrical	MA	Electrical	-do-	-do-	-do-	-do-	-do-	√	P	W	W	By Voltage Meas. accordingly to Polarity
e)	Air pressure test	Visual	MA	Meas. of Pr. Drop in 15 Sec	-do-	-	-do-	-do-	-do-	√	P	V	V	*# # Conduction of Type Tests from S.No. (e) to (l) shall be as per Annexure-A enclosed.* *If Conduction of Type test is required as per Ann-A, then Same shall be Witnessed ('W') by BHEL/Customer in place of Verification('V') under column 'B' and 'C' of AGENCY(10) Above*
f)	Insulation Resistance	Electrical	MA	Electrical & Measurement	-do-	-	-do-	-do-	-do-	√	P	V	V	
g)	Ampere-hour capacity	Electrical	CR	Electrical & Measurement	-do-	-	-do-	-do-	-do-	√	P	V	V	
h)	Retention of Charge	Electrical	CR	Electrical & Measurement	-do-	-	-do-	-do-	-do-	√	P	V	V	
i)	Test for discharge performance at low temp.	Electrical	CR	Electrical & Measurement	-do-	-	-do-	-do-	-do-	√	P	V	V	
j)	Life Cycle Test	Electrical	CR	Electrical & Measurement	-do-	-	-do-	-do-	-do-	√	P	V	V	
k)	Dielectric Test	Electrical	CR	Electrical & Measurement	-do-	-	-do-	-do-	-do-	√	P	V	V	
l)	Storage Test	Electrical	CR	Electrical & Measurement	-do-	-	-do-	-do-	-do-	√	P	V	V	

BHEL						BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGGINEERING			QUALITY			Sign & Date		Doc No.			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared By		Kanhaiya Kumar	Prepared By		Kundan Prasad			Reviewed By			
Checked By		Ayan Saha	Checked By		Harish Kumar			Checked By			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
		CUSTOMER			QP NO.:-PE-QP-999-508-E004, REV.03	DATE:-27/02/2024
		PROJECT			P.O NO.:-	DATE:-
		ITEM:- DC NI-CD BATTERY	SYSTEM:- DC SYSTEM		SECTION:-	SHEET 4 OF 4

SL. NO.	COMPONENT & OPERATIONS	CHARACTERISTIC CHECK	CLASS	TYPE OF CHECK	QUANTUM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	D *	AGENCY			REMARKS
1	2	3	4	5	6		7	8	9		10			11
					M	B/C					**			
											M	B	C	
2.3	**ACCEPTANCE TEST**													
a)	Physical Examination	Visual	MA	Visual	Sampling as per IS-8320	Sampling as per IS-8320	IS:10918 & Approved drg/ doc	IS:10918 & Approved drg/ doc	Inspection Test Report	√	P	W	W	
b)	Dimensions, Mass & Layout	Dimension & Visual	MA	Measurement & Visual	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
c)	Cell marking	Visual	MA	Visual	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
d)	Polarity and absence of short circuit	Electrical	MA	Electrical	-do-	-do-	-do-	-do-	-do-	√	P	W	W	By Voltage Meas. accordingly to Polarity
e)	Air pressure test	Visual	MA	Meas. of Pr. Drop in 15 Sec	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
f)	Insulation Resistance	Electrical	MA	Electrical & Measurement	Sampling as per IS-8320	Sampling as per IS-8320	IS:10918 & Approved drg/ doc	IS:10918 & Approved drg/ doc	Inspection Report	√	P	W	W	
g)	Ampere-hour capacity	Electrical	CR	Electrical & Measurement	-do-	-do-	-do-	-do-	-do-	√	P	W	W	
3.0	**BATTERY RACKS**	Visual & Dimension	MA	Visual & Dimension	1 Sample	1 Sample	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	V	
4.0	**ACCESSORIES**	Visual & Dimension	MA	Visual & Dimension	100%	100%	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	-	
5.0	**CABLE LUGS AND TERMINAL PLATE**	Visual	MA	Visual	100%	100%	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	-	
6.0	**PACKING**	Verification of Packing Methods, Finish & Completeness	MA	Visual	100%	100%	Approved drg/ doc/ As Per Manufacturer Std./ Approved Packing drg/ doc($$)	Approved drg/ doc/ As Per Manufacturer Std./ Approved Packing drg/ doc($$)	-do-	√	P	W	-	($$)- Approved Packing Drg./ Doc Applicable for Export Job/Projects

NOTES:-

1.Wherever IS standard is mentioned, equivalent IEC/International standard is also acceptable as per applicability of test. In case of any technical requirement not covered by IEC, technical requirement as per IS shall prevail. Latest revision/year of issue of all the IS/IEC standard indicated in QAP shall be reffered.

LEGEND :

* RECORDS, INDENTIFIED WITH "TICK"(√) SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION,

** **M:** SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **B**: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **C:** CUSTOMER

P: PERFORM, **W:** WITNESS, **V:** VERIFICATION, AS APPROPRIATE

MA: MAJOR, **MI:** MINOR, **CR:** CRITICAL, **D:** DOCUMENTATION

BHEL						BIDDER/SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGGINEERING			QUALITY			Sign & Date		Doc No.			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared By		Kanhaiya Kumar	Prepared By		Kundan Prasad			Reviewed By			
Checked By		Ayan Saha	Checked By		Harish Kumar			Checked By			

ANNEXURE-A

STANDARD QUALITY PLAN
STANDARD QP NO. : PE-QP-999-508-E004, REV. 03

LIST OF TYPE TEST FOR NI-CD BATTERY

S No	Test	Type test description	Referred standard	Type Test to be specifically conducted (Yes/No)	BHEL/Customer's approval/Review Req. on test certificate (Yes/No)
1	Type Test	• Air pressure test	IS:10918		
		• Insulation Resistance	IS:10918		
		• Ampere-hour capacity	IS:10918		
		• Retention of Charge	IS:10918		
		• Test for discharge performance at low temp.	IS:10918		
		• Life Cycle Test	IS:10918		
		• Dielectric Test	IS:10918		
		• Storage Test	IS:10918		

PAINTING REQUIREMENT

Steel racks duly painted with acid proof paint, shall be suitable for single/double tier arrangement for 220V Battery. These racks shall be made of good quality steel sections. Battery racks and wooden supports for cable terminations shall be coated with three (3) coats of anti-acid paint of approved shade.

	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 1X200 MW + 1X210MW GSECL UKAI TG R&M	PE-TS-499-508-E001 Issue No: 01 Rev. No. 00 Date : 17.09.2025

PACKING REQUIREMENT

Sl.no	DESCRIPTION
1	**Type of Packing:**
1.1	The Battery cells shall be shipped dry, uncharged with electrolyte supplied in non-returnable good quality polyethylene or other suitable containers. Ten percent extra electrolyte shall be supplied to account for any spillage during transit.
1.2	Battery cell shall be packed inside wooden box or crate or fixed on wooden pallet depending upon the size.
1.3	Loose items/accessories shall be separately packed inside wooden box or crate or fixed
2	**Quality of wood:**
2.1	**Quality of wood:** Wood used for packing box shall be Pinewood/Rubber wood/ Mango wood/Fir wood/Silver Oak wood/Junglewood/Plywood or other as per availability with moisture content not exceeding 30%.
3	**Cushioning material and moisture absorber:**
3.1	Suitable cushioning shall be provided by rubberized coir/ thermocol / expanded soft polyethylene foam/honeycomb.
3.2	Adequate quantity of packed desiccant shall be suitably placed inside the packing box.

UNPRICED SCHEDULE

	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 1X200 MW + 1X210MW GSECL UKAI TG R&M	PE-TS-499-508-E001 Issue No: 01 Rev. No. 00 Date : 17.09.2025

ANNEXURE - A

BOQ-CUM-PRICE SCHEDULE (LEAD ACID BATTERY/ NI CD BATTERY) - COMPLETE SCOPE

SL. NO	ITEM CODE	ITEM DESCRIPTION/ SERVICE	UOM	TOTAL QTY	UNIT PRICE	TOTAL PRICE
A		**220V BATTERY**				
A.1	**508-13030-A**	**BREAK UP DETAIL for 220V BATTERY**				
A.1.1		220V, Lead acid/ Ni-Cd battery suitable for MAIN PLANT as per 'Compliance drawings- Annexure-I (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.	Sets	4		
A.1.2		Electrolyte (for first filling plus 10% extra in non-returnable container)	Sets	4		
A.1.3		Wooden racks for lead acid with 3 coats of anti acid paint/ MS racks properly treated with alkali resistance powder	Sets	4		
A.1.4		Stand insulators plus 5% extra	Lot	4		
A.1.5		Intercell, 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.	Lot	4		
A.1.6		Cell numbering tags with fixing arrangement (1set)	Lot	4		
A.1.7		Anti-splash type vent plug	Sets	4		
A.1.8		Nickle coated connection hardware plus 5% extra	Lot	4		
A.1.9		Cable clamps with fixing hardware	Lot	4		
A.1.10		PVC/ CFRP spill trays under battery set (battery to have spill tray covering every cell)	Set	4		
A.1.11		Battery trolley (for entire project)	Set	2		
A.2		**LIST OF ACCESSORIES (Quantity mentioned is to be supplied for each battery bank seperately)**				
A.2.1		Hydrometer	Nos	2		
A.2.2		Cell testing digital voltmeter (3-0-3V) with testing leads	Nos	2		
A.2.3		Wall mounting type holder for hydrometer and thermometer	Nos	2		
A.2.4		Set of Hydrometer syringes suitable for vent holes in different cells	Nos	2		
A.2.5		Thermometer for measuring electrolyte temperature	Nos	5		
A.2.6		Specific gravity correction chart (For Lead Acid Battery Only)	Nos	2		
A.2.7		Rubber apron	Nos	2		
A.2.8		Pair of rubber hand gloves	Pair	2		
A.2.9		Set of Spanners	Nos	2		
A.2.10		" No Smoking" notice	Nos	2		
A.2.11		Goggles (Industrial)	Nos	2		
A.2.12		Instruction card	Nos	10		
A.2.13		Minimum & maximum temperature indicator for each battery room	Nos	1		
A.2.14		Acid / Alkali mixing jar	Nos	1		
B	**508-13007-A**	**E & C SPARES**	Set	1		
B.1		Gloves	Set	12		
B.2		Vent Plugs	Nos	18		
B.3		Intercell connectors	Nos	18		
C	**508-13024-A**	**SUPERVISION OF ERRECTION**				
C.1.1		SUPERVISION OF ERRECTION - BATTERY	DAYS	32		
C.1.2		SUPERVISION OF ERRECTION - BATTERY	VISIT	4		
		SUPERVISION OF COMMISSIONING				
C.2.1		SUPERVISION OF COMMINSSIONING - BATTERY	DAYS	48		
C.2.2		SUPERVISION OF COMMINSSIONING - BATTERY	VISIT	4		

Notes :

1.0	AMOUNT PAYABLE FOR ENGINEER PER VISIT TO SITE = VISIT CHARGES AS PER SL. NO (C.1, C.3) ABOVE + (DAILY CHARGES AS PER SL. NO (C.2, C.4) ABOVE X NO. OF DAYS AT SITE) (TO BE CERTIFIED BY BHEL SITE).
2.0	THE VISIT CHAGRES SHALL BE INCLUSIVE OF CHARGES OF AIR FARE/TRAIN FARE , BOARDING/LODGING, LOCAL CONVEYANCE, MEDICAL , INSURANCE ETC.
3.0	SITE VISIT CHARGES SHALL BE APPLICABLE FOR ANY VISIT MADE BY VENDOR AT SITE AFTER RECEIVING THE INSTRUCTION FROM BHEL FOR DEPUTATION OF VENDOR REPRESENTATIVE. THE VISIT CAN BE CALLED FOR SUPERVISION OF COMMISSIONING & TESTING ETC.
4.0	COPPER LUGS FOR CABLE TERMINATION AT BATTERY TERMINALS SHALL BE IN BIDDER'S SCOPE & CABLE SIZES SHALL BE INFORMED DURING DETAILED ENGINEERING.
5.0	BIDDERS TO QUOTE EITHER FOR LEAD ACID OR NI-CD BATTERY

TECHNICAL SPECIFICATION
DC Lead Acid/ Ni-Cd Battery
1X200 MW + 1X210MW GSECL UKAI TG
R&M

DOCUMENTATION REQUIREMENT

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY ALL THE BIDDERS ALONG WITH THE BID

Sl. No.	DOCUMENT TITLE
1	PQR CREDENTIALS
2	COMPLIANCE SHEET
3	BATTERY SIZING CALCULATION WITH RESPECT TO LOAD DUTY CYCLE ENCLOSED WITH SPEC TO BE PROVIDED ALONG WITH SUPPORTING DOCUMENTS (CAPABILITY / DISCHARGE CURVE, TEMPERATURE CORRECTION FACTOR(AS PER IEEE-485/ IEEE-1115), FLOAT CHARGING FACTOR & PUBLISHED TECHNICAL CATALOGUE) FOR CONSIDERED FACTORS.

DRAWINGS & DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT ALONG WITH SUBMISSION SCHEDULE

Sl. No.	*BHEL Drawing No.*	*CUSTOMER Drawing No.*	*Drawing Title*	*Vendor Sub (Days)**	*BHEL comment (Days)*	*Vendor Sub (Days)#*
Primary Documents						
1	PE-V0-499-508-E101		TDS FOR BATTERY	14	18	10
2	PE-V0-499-508-E306		GA AND BATTERY ROOM LAYOUT OF BATTERY BANK; & CABLE TERMINATION ARRANGEMENT FOR BATTERY TERMINAL	14	18	10
3	PE-V0-499-508-E102		BATTERY SIZING, CATALOGUES, PERFORMANCE CURVES, CAPACITY CURVES, DERATING FACTOR FOR AMBIENT TEMPERATURE	14	18	10
4	PE-V0-499-508-E103		BILL OF MATERIAL FOR BATTERY	14	18	10
5	PE-V0-499-508-E112		BILL OF MATERIAL FOR BHMS	14	18	10
6	PE-V0-499-508-E108		LIST OF MANDATORY SPARES FOR BATTERY **($$)**	14	18	10
7	PE-V0-499-508-E902		QUALITY PLAN FOR BATTERY	14	18	10
8	PE-V0-499-508-E104		TDS, GA & CIRCUIT DIAGRAM FOR BHMS	14	18	10
9	PE-V0-499-508-E111		QUALITY PLAN PLAN FOR BHMS	14	18	10
Secondary Documents						
1	PE-V0-499-508-E105		FIELD QUALITY PLAN FOR BATTERY	30	18	10
2	PE-V0-499-508-E106		LIST OF E & C SPARES FOR BATTERY	30	18	10
3	PE-V0-499-508-E110		TYPE TEST REPORT FOR BATTERY **(%%)**	30	18	10
4	PE-V0-499-508-E107		FAT (FACTORY ACCEPTANCE TEST) PROCEDURE FOR BHMS	30	18	10
5	PE-V0-499-508-E109		O & M MANUAL FOR BATTERY	within 30 days of issuance of MDCC		

NOTES:

a) * 1st submission within indicated days from BHEL Input date

b) # Submission (within indicated days) after incorporating all BHEL comments

c) $$ Primary document for delivery of Mandatory Spares only and not to be linked with Battery supply.

d) %% Endurance tests(If Applicable) report shall be submitted after conduction of the test.

e) Primary documents shall be considered for Delay analysis and secondary documents shall be for engineering completion purpose

DRAWINGS & DOCUMENTS TO BE SUBMITTED AS FINAL/AS-BUILT DOCUMENT

Sl. No.	DOCUMENT TITLE
1	APPROVED DOCUMENTS
2	O&M MANUAL
3	ALL TEST CERTIFICATES

COMPLIANCE CERTIFICATE	
1	It is hereby confirm that the technical specification has been read, understood. We confirm compliance to the tender specification including any clarification and amendments without any deviation.
2	It is hereby declared that any technical submittals which was not specifically asked for in NIT shall stand withdrawn.

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date

	TECHNICAL SPECIFICATION DC Lead Acid/ Ni-Cd Battery 1X200 MW + 1X210MW GSECL UKAI TG R&M	PE-TS-499-508-E001 Issue No: 01 Rev. No. 00 Date : 17.09.2025

PRE QUALIFICATION REQUIREMENT (TECHNICAL)

BHEL	**PRE-QUALIFICATION REQUIRMENTS FOR DC LEAD ACID / Ni-Cd BATTERIES 1X200 MW + 1X210MW GSECL UKAI TG R&M**	PE-PQ-499-508-E001 REVISION NO. 00 DATE 03/09/2025 SHEET NO. 1 OF 1

ITEM AND TYPE OF BATTERY: DC Lead Acid / Ni-Cd Battery

(1) Vendor may be considered for evaluation for one or more of the following type of 220V /110V of DC batteries:

Type 1 - Lead Acid (Plante)
Type 2 - Ni Cd (Fibre Plate)
Type 3 - Ni Cd (Positive Pocket Plate)

(2) Size of battery - 500AH & above

SCOPE: Supply : YES; Erection & Commissioning : NO; Supervision of Erection & Commissioning : YES;

1	Vendor should be designer & manufacturer of the applicable type of Battery.
2	Vendor to furnish published technical catalogue for the applicable type of batteries.
3	Availability of type test certificates conducted at independent Lab or witnessed by third party as per IS/International standards for the applicable type of batteries.
4	In-house capability to carry out all routine and acceptance tests as per IS/International standards for the applicable type of batteries.
5	Option-1: Performance certificate for min. 1 year of trouble-free operation at one (1) industrial installation for the applicable type of batteries. Performance certificate should be from end user only. Performance certificate should not be more than ten (10) years old from the date of application for registration or date of techno- commercial bid opening (as applicable). OR Option-2: Repeat order received from one purchaser/ end user for the applicable type of batteries during last ten (10) years provided the gap between award of two PO's is minimum 2 years.
6	Minimum two (2) nos. purchase orders for the applicable type of batteries shall be submitted which should not be more than five(5) years old from the date of techno- commercial bid opening for establishing continuity in business.

Notes:

1. Consideration of offer shall be subject to customer's approval of bidders, if applicable.
2. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.
3. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
4. After satisfactory fulfillment of all the above criteria/ requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.
5. Attached annexure (Annexure-I) to be filled by the bidder on quality & general terms. Requisite documents (like factory registration certificate, R&D set-up details etc.) asked in Annexure-I, shall also be attached as Annexure-F2.1 to Annexure-F2.17 along with the filled response in Annexure-I.

PREPARED BY	CHAECKED BY	REVIEWED BY	APPROVED BY
Devendra Singh 03.09.2025	03/09/25	03/9/2025	03/09/25
NAME: DEVENDRA SINGH DESIGNATION: MANAGER (E)	NAME: PRIYANKA GUPTA DESIGNATION: SR. MANAGER (E)	NAME: PRAVEEN DUTTA DESIGNATION: AGM (E)	NAME: DEBASISA RATH DESIGNATION: GM & DH (E)

ANNEXURE-1

CORPORATE QUALITY ASSURANCE
SUB-VENDOR QUESTIONNAIRE

i.	Item/Scope of Sub-contracting	
ii.	Address of the registered office	Details of Contact Person (Name, Designation, Mobile, Email)
iii.	Name and Address of the proposed Sub-vendor's works where item is being manufactured	Details of Contact Person: (Name, Designation, Mobile, Email)
iv.	Annual Production Capacity for proposed item/scope of sub-contracting	
v.	Annual production for last 3 years for proposed item/scope of sub-contracting	
vi.	**Details of proposed works**	
1.	Year of establishment of present works	
2.	Year of commencement of manufacturing at above works	
3.	Details of change in Works address in past (if any)	
4.	Total Area	
	Covered Area	
5.	Factory Registration Certificate	Details attached at Annexure – F2.1
6.	Design/ Research & development set-up (No. of manpower, their qualification, machines & tools employed etc.)	Applicable / Not applicable if manufacturing is as per Main Contractor/purchaser design) Details attached at Annexure – F2.2 (if applicable)
7.	Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc)	Details attached at Annexure – F2.3
8.	After sales service set up in India, in case of foreign sub-vendor (Location, Contact Person, Contact details etc.)	Applicable / Not applicable Details attached at Annexure – F2.4
9.	Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any	Details attached at Annexure – F2.5
10.	Sources of Raw Material/Major Bought Out Item	Details attached at Annexure – F2.6
11	Quality Control exercised during receipt of raw material/BOI, in-process, Final Testing, packing	Details attached at Annexure – F2.7

ANNEXURE-1

CORPORATE QUALITY ASSURANCE
SUB-VENDOR QUESTIONNAIRE

12.	*Manufacturing facilities* *(List of machines, special process facilities, material handling etc.)*	*Details attached at Annexure – F2.8*
13.	*Testing facilities* *(List of testing equipment)*	*Details attached at Annexure – F2.9*
14.	*If manufacturing process involves fabrication then-*	*Applicable / Not applicable*
	List of qualified Welders	*Details attached at Annexure – F2.10*
	List of qualified NDT personnel with area of specialization	*(if applicable)*
15.	*List of out-sourced manufacturing processes with Sub-Vendors' names & addresses*	*Applicable / Not applicable* *Details attached at Annexure. –F2.11* *(if applicable)*
16.	*Supply reference list including recent supplies*	*Details attached at Annexure – F2.12* *(as per format given below)*

Project/ package	*Customer Name*	*Supplied Item (Type/Rating/Model /Capacity/Size etc)*	*PO ref no/date*	*Supplied Quantity*	*Date of Supply*

17.	*Product satisfactory performance feedback letter/certificates/End User Feedback*	*Attached at annexure - F2.13*
18.	*Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product (similar or higher rating)* *Note:- Reports need not to be submitted*	*Applicable / Not applicable* *Details attached at Annexure – F2.14* *(if applicable)*
19.	*Statutory / mandatory certification for the proposed product*	*Applicable / Not applicable* *Details attached at Annexure – F2.15* *(if applicable)*
20.	*Copy of ISO 9001 certificate (if available)*	*Attached at Annexure – F2.16*
21.	*Product technical catalogues for proposed item (if available)*	*Details attached at Annexure – F2.17*

Name:		*Desig:*		*Sign:*		*Date:*	

Company's Seal/Stamp:-

Report ID: GEM/GARPTS/29082025/KWKJTNBQGC24
Report Name: DC Lead Acid / Ni-Cd Battery
Generated By: Devendra Singh , Department of Heavy Industry , Ministry of Heavy Industries and Public Enterprises

Generated On: 29/08/2025
Valid till: 28/09/2025

GeM Availability Report and Past Transaction Summary

GeM Availability Report and past transaction summary report is generated based on the specifications searched by the Buyer. The specification may be modified appropriately for searching relevant categories on GeM. Buyer may navigate to GeM category page by clicking on the category link to view category specifications and products/services available in the category.

Order Count and Order Value displayed is on a cumulative basis since GeM inception.

1. Search String: DC Lead Acid / Ni-Cd Battery

Search type: Product

1. There are categories available on GeM matching your requirements (as listed here). You can create a bid on GeM with a product closest matching your required specifications and add additional parameters in specifications through Corrigendum using RMS functionality.
2. If you feel that category TP needs updating you can submit category updating request also through RMS.
3. If you do not want to use any of the above option and want to proceed for procurement outside GeM, please suggest the specifications of the required product for creation of new category on GeM for future procurement.

Search Result: Category available/suggested on GeM but marked as "not matching requirements" by the buyer with undertaking as under:

It is certified that I have thoroughly checked all probable categories suggested by GeM and I am satisfied that the product required is not covered / does not fall in any of the suggested categories and can not be procured under any of these categories even after inclusion of List of Values(LOV) wherever possible in category specifications of suggested categories. It is also certified that the technical specification requirement are such that these can not be covered even by adding specification parameters using ATC in any of the GeM suggested categories. This is a one-time requirement hence new category creation is not proposed / or requirement is recurring but request for new category creation will be submitted separately post generation of GeMARPTS.

Estimated Value Of Procurement: ₹ 1.0

Category Name	Catalog Count	Order Count			Order Value (in Lakhs)		
		Direct Purchase	Reverse Auction	Bid	Direct Purchase	Reverse Auction	Bid
Lead Acid Traction Batteries (V2) Confirming To IS 5154 / IEC 60254	59	417	3	21	596	10	49
Battery Secondary Lead Acid MT Type (Defence)	290	926	479	318	1,672	11,297	3,524
General Purpose Battery Chargers	155	1,718	4	22	537	15	22
Lead Acid starter Batteries	960	20,366	221	928	8,932	527	901
Stationary Valve Regulated Lead Acid Batteries (V2) as per IS 15549	2,633	26,716	410	1,018	16,563	1,436	2,846

Category Name	Catalog Count	Order Count			Order Value (in Lakhs)		
		Direct Purchase	Reverse Auction	Bid	Direct Purchase	Reverse Auction	Bid
Lead Acid Tubular Tbs Battery(Oil India Limited)-IS:1651	0	12	0	0	0	0	0
Stationary Lead Acid Batteries (with Tubular Positive Plates) in Monobloc Containers as per IS 13369	831	9,833	39	205	7,731	197	448
Lead nitrate	21	328	0	4	12	0	0
Lead Acid Storage Batteries for Motor Vehicles as per IS 7372	682	2,031	174	599	1,387	458	812
DC ADAPTOR FOR CDSC (OFB)	13	2,129	0	1	104	0	0