1407960/2023/PS-PEM-EL

BHEL	**PRE-QUALIFICATION REQUIRMENTS FOR DC LEAD ACID / Ni-Cd BATTERIES** **[4X210MW + 3X500MW KAHALGAON & 2X500 MW SIPAT FGD PROJCTS]**	PE-PQ-XXX-508-E006 REVISION NO. 01 DATE 03/04/2023 SHEET NO. 1 OF 1

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

Vendor may be considered for evaluation for one or more of the following type of 220V of DC batteries:

Type 1 - Lead Acid (Plante) – 150AH & above
Type 2 - Ni Cd (Positive Pocket Plate) – 90AH & 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 certificates for min. 2 years of trouble-free operation at two (2) different installations/sites for the applicable type of batteries. Performance certificate should be from end user only. Performance certificates should not be more than ten (10) years old from the date of techno- commercial bid opening. OR Option-2: Repeat order received from 2 different purchaser's / end users for the applicable type of batteries during last ten (10) years provided the gap between award of two POs is minimum 2 years. OR Option-3: 1 no. performance certificate (as per Option-1) and 1 no. repeat order (as per Option-2).
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 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. 'XXX' in document no. is to be read as **481** (for 4X210 MW + 3X500MW KAHALGAON FGD); & **491** (for 2X500 MW SIPAT FGD).

PREPARED BY	CHECKED BY	REVIEWED BY	APPROVED BY
NAME: VIKAS KUMAR SINGH / KHUSHBU AGRAWAL DESIGNATION: MANAGER (E)/ MANAGER (E)	NAME: KANHAIYA KUMAR/ AYAN SAHA DESIGNATION: SR. MANAGER (E)/ DGM (E)	NAME: SANDEEP LODH / PRAVEEN DUTTA DESIGNATION: SR. DGM (E) / AGM (E)	NAME: DEBASISA RATH DESIGNATION: AGM & DH (E)

4x210 MW+3 X 500 MW NTPC KAHALGAON FGD PACKAGE
ANNEXURE - IA
BOQ (LEAD-ACID PLANTE BATTERY)

Sr. No.	Item code	Item Description	Unit	QUANTITY
A	**508-14001-A**	**220V BATTERY**	Sets	4
A.1		**Break up detail**		
A.1.1		220V , Lead acid plante battery (1 set comprises 108 nos cell) as per load duty cycle (minimum 150AH)	Sets	4
A.1.2		Electrolyte (sulphuric acid for first filling plus 10% extra)	Sets	4
A.1.3		Teakwood racks with 3 coats of anti acid paints for 220V DC Battery	Sets	4
A.1.4		Stand insulators plus 5% extra	lot	4
A.1.5		Cell interconnectors (inter cell,inter row & inter bank connectors)with 5% extra and end take-off with one no. extra	lot	4
A.1.6		Lead coated connection hardware plus 5% extra	lot	4
A.1.7		Cell numbering tags with fixing arrangement (1set)	lot	4
A.1.8		Teakwood Cable clamps with hardware	lot	4
A.1.9		PVC spill trays under battery set(battery to have spill tray covering every cell)	Set	4
A.2		**LIST OF ACCESSORIES (for each set of battery)**		
A.2.1		Rubber syphon	Nos	1
A.2.2		Hydrometer (in step of 0.005)	Nos	1
A.2.3		Set of hydrometer syringes (suitable for the vent holes in different cells)	Nos	1
A.2.4		Specific gravity correction chart	Nos	1
A.2.5		Thermometer with plug & cap, specific gravity correction scale (for measuring electrolyte temperature)	Nos	1
A.2.6		Wall mounting type holder made of teak wood for hydrometer and thermometer	Nos	1
A.2.7		Digital Cell testing voltmeter (2-0-2V) with leads	Nos	1

4x210 MW+3 X 500 MW NTPC KAHALGAON FGD PACKAGE
ANNEXURE - IA
BOQ (LEAD-ACID PLANTE BATTERY)

Sr. No.	Item code	Item Description	Unit	QUANTITY
A.2.8		Acid Resistance Funnel	Nos	1
A.2.9		Acid Resistance jug of adequate capacity	Nos	1
A.2.10		Rubber apron	Nos	1
A.2.11		Rubber hand gloves	Pair	1
A.2.12		Set of insulated spanners	Nos	1
A.2.13		Cell lifting straps	Set	1
A.2.14		`No smoking' notice	Nos	2
A.2.15		Bridging Clamp for cutting out individual cells in the event of defect.	set	1
A.2.16		Goggles (industrial)	Nos	1
A.2.17		Instruction card	Nos	4
A.2.18		Pocket Thermometer (digital Type)	Nos	1
A.2.19		First aid box	Set	1
A.2.20		Cable clamps with fixing hardware	set	1
A.2.21		Battery log book	Nos	1
B	**508-14010-A**	**E & C SPARES**		
B.1		GLOVES	Pair	2
B.2		VENT PLUGS	Nos	10
B.3		Intercell connectors	Nos	10
C	**508-14016-A**	**SUPERVISION OF E&C (All the equipment will be provided by BHEL).**		
C.1		LUMP SUM CHARGES PER VISIT FOR ENGINEER (EXCEPT DAILY CHARGES) (REFER NOTE-1, 2 & 3)	VISIT	4
C.2		LUMP SUM DAILY CHARGES FOR ENGINEER (REFER NOTE-1, 2 & 3)	DAYS	20

4x210 MW+3 X 500 MW NTPC KAHALGAON FGD PACKAGE
ANNEXURE - IA
BOQ (LEAD-ACID PLANTE BATTERY)

Sr. No.	Item code	Item Description	Unit	QUANTITY
D	**508-14000-B**	**MANDATORY SPARES**		
D.1		Complete dry cell	Nos	5
D.2		Intercell connectors with Hardware	Nos	5
D.3		Vent Plug	Nos	5
D.4		Electrolyte Level indicating float (For opaque containers only)	Nos	5
D.5		Stand Insulator	Nos	5
D.6		Cell Insulator	Nos	5
Notes				

1.0	AMOUNT PAYABLE FOR ENGINEER PER VISIT TO SITE = VISIT CHARGES AS PER SL. NO (C.1) ABOVE + (DAILY CHARGES AS PER SL. NO (C.2) ABOVE X NO. OF DAYS AT SITE) (TO BE CERTIFIED BY BHEL SITE).
2.0	THE VISIT CHARGES 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
6.0	EACH SET / LOT MENTIONED AGAINST ITEM AT S.NO A.1.2 TO A.1.9 CORRESPONDS TO REQUIRED QUANTITY FOR 1 SET OF ITEM AT S.NO.A.1.1.

4x210 MW+3 X 500 MW NTPC KAHALGAON FGD PACKAGE
ANNEXURE - IIA
BOQ (NI-CD BATTERY)

Sr. No.	Item code	Item Description	Unit	QUANTITY
A	**508-14001-A**	**220V BATTERY**	Sets	4
A.1		**Break up detail**		
A.1.1		220V , Ni-Cd battery (1 set comprises 170 nos. cell) as per load duty cycle (minimum 90AH)	Sets	4
A.1.2		Electrolyte (For first filling plus10% extra)	Sets	4
A.1.3		MS racks with 3 coats of anti alkali paints for 220V DC Battery	Sets	4
A.1.4		Stand insulators plus 5% extra	lot	4
A.1.5		Cell interconnectors (inter cell,inter row & inter bank connectors) with 5% extra and end take-off with one no. extra	lot	4
A.1.6		Nickel coated connection hardware plus 5% extra	lot	4
A.1.7		Cell numbering tags with fixing arrangement (1set)/ Self adhesive PVC numbering stickers.	lot	4
A.1.8		PVC/ CFRP spill trays under battery set(battery to have spill tray covering every cell)	Set	4
A.2		**LIST OF ACCESSORIES (for each set of battery)**		
A.2.1		Mercury in chemical glass Thermometer (0 - 100 deg C)	Nos	1
A.2.2		Alkali resistance funnel	Nos.	1
A.2.3		Alkali Resistance jug of 2 L capacity	Nos	1
A.2.4		Rubber Syphon	Nos	1
A.2.5		Rubber apron	Nos	1
A.2.6		Rubber hand gloves	Pair	1
A.2.7		Bridging Clamp for cutting out individual cells in the event of defect.	Nos.	1
A.2.8		Cell testing digital voltmeter (2-0-2V) with testing leads	Nos	1
A.2.9		Set of insulated spanners	Nos	1
A.2.10		Goggles (industrial)	Nos	1
A.2.11		Instruction card	Nos	4
A.2.12		Battery log book	Nos	1
A.2.13		`No smoking' notice	Nos	2
A.2.14		First aid box	Set	1
A.2.15		Cable clamps with fixing hardware (If applicable).	set	1

4x210 MW+3 X 500 MW NTPC KAHALGAON FGD PACKAGE
ANNEXURE - IIA
BOQ (NI-CD BATTERY)

Sr. No.	Item code	Item Description	Unit	QUANTITY
A.2.16		Cell lifting straps/ Cell lifting puller.	set	1
A.2.17		Copper Cell Connector	Nos	5
B	**508-14010-A**	**E & C SPARES**		
B.1		GLOVES	Pair	2
B.2		VENT PLUGS	Nos	10
B.3		Intercell connectors	Nos	10
C	**508-14016-A**	**SUPERVISION OF E&C (All the equipment will be provided by BHEL).**		
C.1		LUMP SUM CHARGES PER VISIT FOR ENGINEER (EXCEPT DAILY CHARGES) (REFER NOTE-1, 2 & 3)	VISIT	4
C.2		LUMP SUM DAILY CHARGES FOR ENGINEER (REFER NOTE-1, 2 & 3)	DAYS	20
D	**508-14000-B**	**MANDATORY SPARES**		
D.1		Complete dry cell	Nos	5
D.2		Intercell connectors with Hardware	Nos	5
D.3		Vent Plug	Nos	5
D.4		Electrolyte Level indicating float (For opaque containers only)	Nos	5
D.5		Stand Insulator	Nos	5
D.6		Cell Insulator	Nos	5
Notes				

1.0	AMOUNT PAYABLE FOR ENGINEER PER VISIT TO SITE = VISIT CHARGES AS PER SL. NO (C.1) ABOVE + (DAILY CHARGES AS PER SL. NO (C.2) 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
6.0	EACH SET / LOT MENTIONED AGAINST ITEM AT S.NO A.1.2 TO A.1.8 CORRESPONDS TO REQUIRED QUANTITY FOR 1 SET OF ITEM AT S.NO.A.1.1.

2 X 500 MW NTPC SIPAT FGD PACKAGE
ANNEXURE - IA
BOQ (LEAD-ACID PLANTE BATTERY)

Sr. No.	Item code	Item Description	Unit	QUANTITY
A	**508-14001-A**	**220V BATTERY**	Sets	2
A.1		**Break up detail**		
A.1.1		220V , Lead acid plante battery (1 set comprises 108 nos cell) as per load duty cycle (minimum 150AH)	Sets	2
A.1.2		Electrolyte (sulphuric acid for first filling plus 10% extra)	Sets	2
A.1.3		Teakwood racks with 3 coats of anti acid paints for 220V DC Battery	Sets	2
A.1.4		Stand insulators plus 5% extra	lot	2
A.1.5		Cell interconnectors (inter cell,inter row & inter bank connectors)with 5% extra and end take-off with one no. extra	lot	2
A.1.6		Lead coated connection hardware plus 5% extra	lot	2
A.1.7		Cell numbering tags with fixing arrangement (1set)	lot	2
A.1.8		Teakwood Cable clamps with hardware	lot	2
A.1.9		PVC spill trays under battery set(battery to have spill tray covering every cell)	Set	2
A.2		**LIST OF ACCESSORIES (for each set of battery)**		
A.2.1		Rubber syphon	Nos	1
A.2.2		Hydrometer (in step of 0.005)	Nos	1
A.2.3		Set of hydrometer syringes (suitable for the vent holes in different cells)	Nos	1
A.2.4		Specific gravity correction chart	Nos	1
A.2.5		Thermometer with plug & cap, specific gravity correction scale (for measuring electrolyte temperature)	Nos	1
A.2.6		Wall mounting type holder made of teak wood for hydrometer and thermometer	Nos	1
A.2.7		Digital Cell testing voltmeter (2-0-2V) with leads	Nos	1

2 X 500 MW NTPC SIPAT FGD PACKAGE
ANNEXURE - IA
BOQ (LEAD-ACID PLANTE BATTERY)

Sr. No.	Item code	Item Description	Unit	QUANTITY
A.2.8		Acid Resistance Funnel	Nos	1
A.2.9		Acid Resistance jug of adequate capacity	Nos	1
A.2.10		Rubber apron	Nos	1
A.2.11		Rubber hand gloves	Pair	1
A.2.12		Set of insulated spanners	Nos	1
A.2.13		Cell lifting straps	Set	1
A.2.14		`No smoking' notice	Nos	2
A.2.15		Bridging Clamp for cutting out individual cells in the event of defect.	set	1
A.2.16		Goggles (industrial)	Nos	1
A.2.17		Instruction card	Nos	4
A.2.18		Pocket Thermometer (digital Type)	Nos	1
A.2.19		First aid box	Set	1
A.2.20		Cable clamps with fixing hardware	set	1
A.2.21		Battery log book	Nos	1
B	**508-14010-A**	**E & C SPARES**		
B.1		GLOVES	Pair	1
B.2		VENT PLUGS	Nos	5
B.3		Intercell connectors	Nos	5
C	**508-14016-A**	**SUPERVISION OF E&C (All the equipment will be provided by BHEL).**		
C.1		LUMP SUM CHARGES PER VISIT FOR ENGINEER (EXCEPT DAILY CHARGES) (REFER NOTE-1, 2 & 3)	VISIT	2
C.2		LUMP SUM DAILY CHARGES FOR ENGINEER (REFER NOTE-1, 2 & 3)	DAYS	10

2 X 500 MW NTPC SIPAT FGD PACKAGE
ANNEXURE - IA
BOQ (LEAD-ACID PLANTE BATTERY)

Sr. No.	Item code	Item Description	Unit	QUANTITY
D	**508-14000-B**	**MANDATORY SPARES**		
D.1		Complete dry cell	Nos	5
D.2		Intercell connectors with Hardware	Nos	5
D.3		Vent Plug	Nos	5
D.4		Electrolyte Level indicating float (For opaque containers only)	Nos	5
D.5		Stand Insulator	Nos	5
D.6		Cell Insulator	Nos	5
Notes				

1.0	AMOUNT PAYABLE FOR ENGINEER PER VISIT TO SITE = VISIT CHARGES AS PER SL. NO (C.1) ABOVE + (DAILY CHARGES AS PER SL. NO (C.2) ABOVE X NO. OF DAYS AT SITE) (TO BE CERTIFIED BY BHEL SITE).
2.0	THE VISIT CHARGES 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
6.0	EACH SET / LOT MENTIONED AGAINST ITEM AT S.NO A.1.2 TO A.1.9 CORRESPONDS TO REQUIRED QUANTITY FOR 1 SET OF ITEM AT S.NO.A.1.1.

2 X 500 MW NTPC SIPAT FGD PACKAGE
ANNEXURE - IIA
BOQ-CUM (NI-CD BATTERY)

Sr. No.	Item code	Item Description	Unit	QUANTITY
A	**508-14001-A**	**220V BATTERY**	Sets	2
A.1		**Break up detail**		
A.1.1		220V , Ni-Cd battery (1 set comprises 170 nos. cell) as per load duty cycle (minimum 90AH)	Sets	2
A.1.2		Electrolyte (For first filling plus10% extra)	Sets	2
A.1.3		MS racks with 3 coats of anti alkali paints for 220V DC Battery	Sets	2
A.1.4		Stand insulators plus 5% extra	lot	2
A.1.5		Cell interconnectors (inter cell,inter row & inter bank connectors) with 5% extra and end take-off with one no. extra	lot	2
A.1.6		Nickel coated connection hardware plus 5% extra	lot	2
A.1.7		Cell numbering tags with fixing arrangement (1set)/ Self adhesive PVC numbering stickers.	lot	2
A.1.8		PVC/ CFRP spill trays under battery set(battery to have spill tray covering every cell)	Set	2
A.2		**LIST OF ACCESSORIES (for each set of battery)**		
A.2.1		Mercury in chemical glass Thermometer (0 - 100 deg C)	Nos	1
A.2.2		Alkali resistance funnel	Nos.	1
A.2.3		Alkali Resistance jug of 2 L capacity	Nos	1
A.2.4		Rubber Syphon	Nos	1
A.2.5		Rubber apron	Nos	1
A.2.6		Rubber hand gloves	Pair	1
A.2.7		Bridging Clamp for cutting out individual cells in the event of defect.	Nos.	1
A.2.8		Cell testing digital voltmeter (2-0-2V) with testing leads	Nos	1
A.2.9		Set of insulated spanners	Nos	1
A.2.10		Goggles (industrial)	Nos	1
A.2.11		Instruction card	Nos	4
A.2.12		Battery log book	Nos	1
A.2.13		`No smoking' notice	Nos	2
A.2.14		First aid box	Set	1
A.2.15		Cable clamps with fixing hardware (If applicable).	set	1

2 X 500 MW NTPC SIPAT FGD PACKAGE
ANNEXURE - IIA
BOQ-CUM (NI-CD BATTERY)

Sr. No.	Item code	Item Description	Unit	QUANTITY
A.2.16		Cell lifting straps/ Cell lifting puller.	set	1
A.2.17		Copper Cell Connector	Nos	5
B	**508-14010-A**	**E & C SPARES**		
B.1		GLOVES	Pair	1
B.2		VENT PLUGS	Nos	5
B.3		Intercell connectors	Nos	5
C	**508-14016-A**	**SUPERVISION OF E&C (All the equipment will be provided by BHEL).**		
C.1		LUMP SUM CHARGES PER VISIT FOR ENGINEER (EXCEPT DAILY CHARGES) (REFER NOTE-1, 2 & 3)	VISIT	2
C.2		LUMP SUM DAILY CHARGES FOR ENGINEER (REFER NOTE-1, 2 & 3)	DAYS	10
D	**508-14000-B**	**MANDATORY SPARES**		
D.1		Complete dry cell	Nos	5
D.2		Intercell connectors with Hardware	Nos	5
D.3		Vent Plug	Nos	5
D.4		Electrolyte Level indicating float (For opaque containers only)	Nos	5
D.5		Stand Insulator	Nos	5
D.6		Cell Insulator	Nos	5
Notes				

1.0	AMOUNT PAYABLE FOR ENGINEER PER VISIT TO SITE = VISIT CHARGES AS PER SL. NO (C.1) ABOVE + (DAILY CHARGES AS PER SL. NO (C.2) 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
6.0	EACH SET / LOT MENTIONED AGAINST ITEM AT S.NO A.1.2 TO A.1.8 CORRESPONDS TO REQUIRED QUANTITY FOR 1 SET OF ITEM AT S.NO.A.1.1.

4X210MW + 3X500MW KAHALGAON SUPER THERMAL POWER STATION, STAGE-I & II

&

2X500 MW NTPC SIPAT SUPER THERMAL POWER, FGD PACKAGE, STAGE-II

VOLUME – II

TECHNICAL SPECIFICATION FOR

220V DC Lead Acid / Ni-Cd BATTERY

SPECIFICATION NO: *PE-TS-481/491-508-E001*

BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, UTTAR PRADESH, INDIA – 201301

	TECHNICAL SPECIFICATION FOR 220V DC BATTERY	**SPECIFICATION NO.** PE-TS-481/491-508-E001
		VOLUME II
		REVISION 0 | **DATE :**06.04.2023
		SHEET 1 OF 1

CONTENTS

TOTAL NO. OF SHEETS =37 (INCLUDING COVER/ SEPARATOR SHEETS)

	TECHNICAL SPECIFICATION FOR 220V DC BATTERY	SPECIFICATION NO. PE-TS- 481/491-508-E001
		VOLUME II
		REVISION 0 / DATE: 06.04.2023
		SHEET 1 of 1

COMPLIANCE CERTIFICATE

The bidder shall confirm compliance to the following by signing/ stamping this compliance certificate and furnishing same with the offer.

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same.

2. There are no deviation with respect to specification other than those furnished in the 'schedule of deviations'.

3. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.

4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.

5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in BOQ-Cum-Price schedule enclosed with NIT shall not be considered (i.e., technical description & quantities as per specification shall prevail).

BIDDER'S STAMP & SIGNATURE

	TECHNICAL SPECIFICATION FOR 220V DC BATTERY	SPECIFICATION NO. PE-TS- 481/491-508-E001	
		VOLUME II	
		SECTION I	
		REVISION 0	DATE: 06.04.2023
		SHEET 1 OF 2	

SECTION –I

SPECIFIC TECHNICAL REQUIREMENTS

	TECHNICAL SPECIFICATION FOR 220V DC BATTERY	SPECIFICATION NO. PE-TS- 481/491-508-E001	
		VOLUME II	
		SECTION I	
		REVISION 0	DATE: 06.04.2023
		SHEET 2 OF 2	

1.0 SCOPE OF ENQUIRY

1.1 This specification covers the design, manufacture, inspection and testing at manufacturer's works, proper packing and delivery to site & supervision of E&C of **220V DC BATTERY**.

1.2 Standard technical requirements of the **220V DC BATTERY** are indicated in Section-II. Project specific technical/ quality requirements / changes are listed in Section-I & Data Sheet-A.

1.3 The stipulations of Section-I, followed by those of Data Sheet-A, followed by Section-II shall prevail in case of any conflict between the stipulations of Section-I, Section-II & Datasheet-A.

2.0 BILL OF QUANTITIES:

2.1 Quantity requirements shall be as per **BOQ cum Unpriced Price Schedule** enclosed with NIT.

2.0 SPECIFIC TECHNICAL REQUIREMENTS:

3.1 Technical /Quality/ Inspection:

S. No.	*Reference clause No. of Section II (if any)*	*Specific Requirement/ Change*

3.2 Documents required after award of LOI shall be as per NIT.

3.3 In BOM each of the item to be uniquely identified with item code no. or item Sl. No. Supplier to ensure that all the items which will find separate mention in the packing list are covered in detailed BOM.
Supplier to give following undertaking in BOM:
" The BOM provided here completes the scope (in content and intent) of material supply under PO no. ---- dtd ----- 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."

	TECHNICAL SPECIFICATION FOR 220V DC BATTERY	SPECIFICATION NO. PE-TS-481/491-508-E001	
		VOLUME II	
		SECTION I	
	DATA SHEET–A	REVISION 0	DATE :06.04.2023
		SHEET 1 OF 1	

1.	Rated voltage (V)	:	220V DC
2.	Type of Battery	:	Lead-Acid Plante OR Ni-Cd high discharge Pocket Plate type
3.	Conforming to	:	IEEE/ IEC/ IS standards
4.	DC system Fault level & duration	:	*25KA for 1 Sec*
5.	Material of Battery Rack	:	*Seasoned Teak Wooden for Lead Acid Battery/ Mild Steel Racks for Ni-CD battery*
6.	Design Ambient Temperature	:	50 Deg. C
7.	Minimum Electrolyte Temperature to be considered for Battery Sizing	:	*15* Deg. C
8.	No. of cells	:	*108 for Lead Acid Battery/ 170 for Ni-Cd Battery*
9.	End cell voltage		*1.85V/cell (Lead Acid) / 1.14V/ cell (Ni- Cd)*
10.	Nominal Float voltage (V)	:	2.25 V/cell (Lead-Acid)/1.42V/cell (Ni-Cd)
11.	Boost voltage (Maximum) (V)	:	2.7V/cell (Lead-Acid)/1.54 to 1.7V/cell(Ni-Cd)
12.	Minimum AH rating of Battery	:	150AH for Lead acid plante type / 90 AH for NiCd high discharge pocket plate type battery
13.	Load Cycle for sizing battery	:	Refer attached Annexure-II **
14.	Arrangement of batteries on racks	:	Single tier for batteries having cell weight 50kg or more.
15.	Cable size to be terminated at Battery end	:	*2 Run-1Cx630 sq.mm*
16.	Tapping to be provided in battery	:	*No*
17.	Tapping to be provided at which cell (if Tapping is applicable)	:	*NA*
18.	Recommended boost charging rate	:	Bidder to furnish the detail along with offer
19.	Recommended trickle charging rate	:	Bidder to furnish the detail along with offer

Notes :

1. Suitable number of copper lugs for cable termination at battery terminals shall be provided by bidder as per cable size to be informed by BHEL during detailed engineering. Tentative size of cable is mentioned above at sl. no. 15.

** If battery AH as per load cycle exceeds minimum value mentioned against sr. no. 12 of data sheet , bidder has to quote for that battery rating . If battery AH as per load cycle is below the minimum value mentioned against sr. no. 12 of data sheet , bidder has to quote for battery rating mentioned at sr. no. 12 of data sheet

	TECHNICAL SPECIFICATION FOR 220V BATTERY	**SPECIFICATION NO.** PE-TS-481/491-508-E001
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	DATA SHEET–C	**SHEET** 1 OF 2

Sr. No.	PARAMETER	UNIT	VALUE
1.0	Make and Type		
2.0	AH capacity at 27º C and end voltage		
2.1	At 10 Hr discharge rate	AH	
2.2	At 1 Hr discharge rate	AH	
3.0	Battery Discharge current		
3.1	At one minute rate	Amp	
3.2	At 30 minutes rate	Amp	
3.3	At 30 minutes rate at end voltage	Amp	
3.4	At 60 minutes rate	Amp	
3.5	At 60 minutes rate at end voltage	Amp	
4.0	Types of plates		
4.1	Negative plates		
4.2	Positive plates		
5.0	Method of connection between cells		
6.0	Voltage per cell at the end of charge at the finishing rate	V	
7.0	Recommended Trickle charge current	Amp	
8.0	Type and material of separators		
9.0	Material of container		
10.0	Type of container		
11.0	Internal resistance of cells	Ohms	
12.0	Total resistance of connectors	Ohms	
13.0	Insulator Material for		
13.1	Cells		
13.2	Racks		
14.0	Average life	Years	
15.0	Recommended boost charger rating for		
15.1	Charging in 8 hours	Amp	

	TECHNICAL SPECIFICATION FOR 220V BATTERY DATA SHEET–C	SPECIFICATION NO. PE-TS-481/491-508-E001
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15.2	Charging in 10 hours	Amp	
16.0	Allowable ripple content acceptable to battery (r.m.s)	%	
17.0	Hydrogen evaluation		
18.0	Cell designation in accordance with IS: 1651/1652 or equivalent IEC		
19.0	Applicable standard		
20.0	Whether battery performance curve and calculation for capacities enclosed		
21.0	Recommended Maximum period of storage of Electrolyte before first charge		
22.0	Amount and specific gravity of electrolyte per cell required for first filling at 27° C		
23.0	Recommended specific gravity of electrolyte at 27° C		
23.1	When fully charged		
23.2	When fully discharged		
24.0	Container dimensions	(L X B X H)mm	
25.0	Distance between centres of cells when erected	Mm	
26.0	Terminal connectors		
26.1	Type		
26.2	Material		
27.0	Battery Racks		
27.1	Type & Material		
27.2	Outline dimensions	(L X B X H) mm	
27.3	Net weight	Kg	
28.0	Weight per cell	Kg	
28.1	Net dry weight	Kg	
28.2	Net weight with electrolyte	Kg	
29.0	Total shipping weight of one battery unit (without electrolyte)	Kg	
30.0	Taps provided at cell no.		
31.0	Connection from battery to charger (busbar/ cable)		
32.0	Recommended size of (busbar/ cable)		
33.0	Whether backup calculation furnished		
34.0	Cable Lugs at Battery terminals of suitable size		

	TECHNICAL SPECIFICATION FOR 220V DC BATTERY	SPECIFICATION NO.PE-TS-481/491-508-E001
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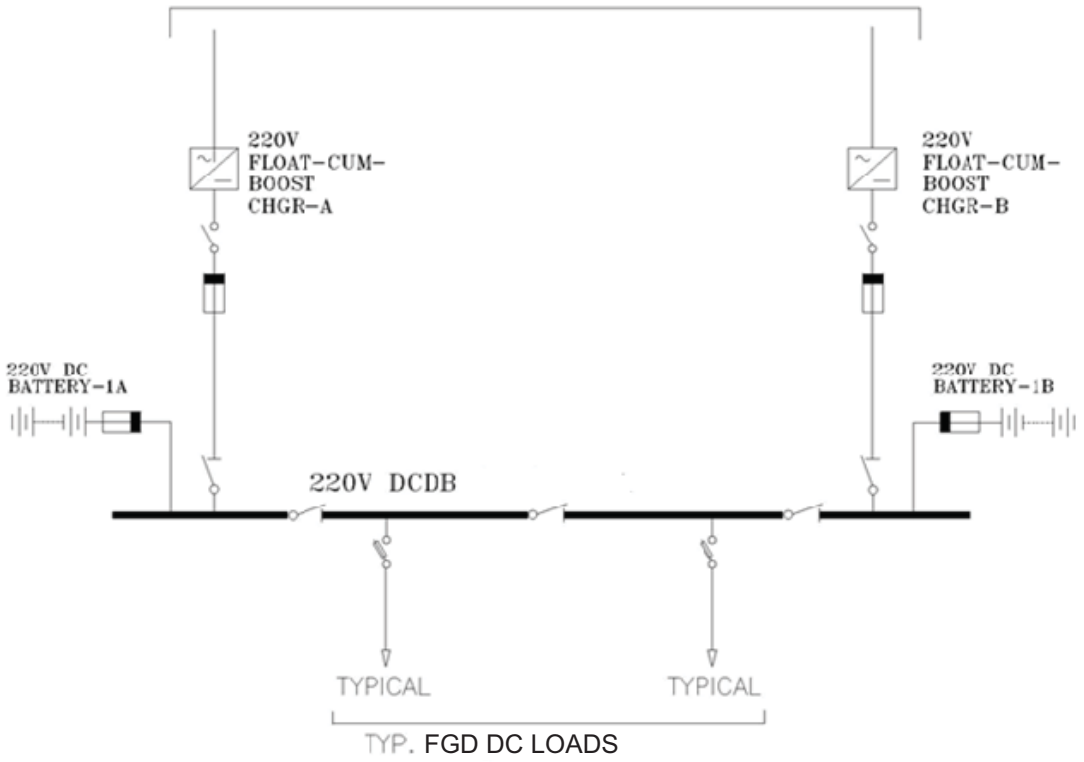
ANNEXURE-I

SINGE LINE DIAGRAM FOR 220V DC SYSTEM FOR FGD SYSTEM



	TECHNICAL SPECIFICATION FOR 220V DC BATTERY	SPECIFICATION NO. PE-TS-481/491-508-E001
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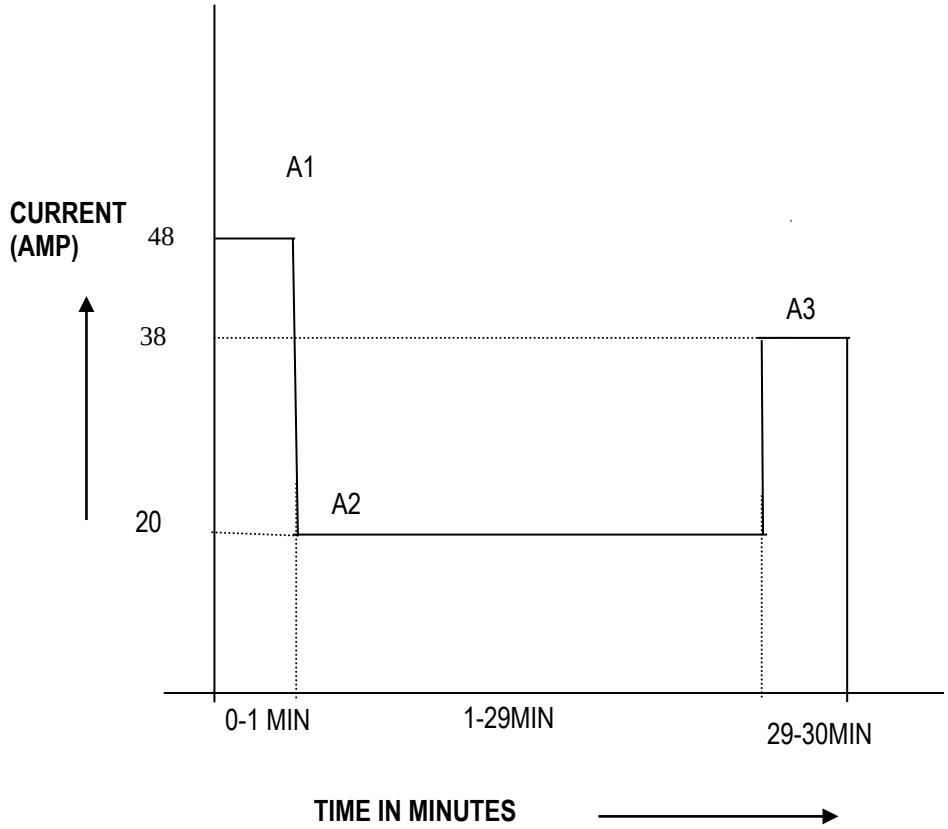
ANNEXURE-II

LOAD DUTY CYCLE



FACTORS TO BE CONSIDERED FOR BATTERY SIZING:

MINIMUM ALLOWABLE CABLE VOLTAGE DROP	12.8 V for lead acid battery (108 x 1.85 V /cell - 187 V) / 6.8 V for Ni-Cd battery (170 x 1.14 V/ cell -187 V)
AGEING FACTOR	1.25
MIN.ELECTROLYTIC TEMP.	15 °C
DESIGN MARGIN	-NA-
BATTERY LOAD CYCLE DURATION	Supply total DC load of the associated area at an acceptable voltage for at least 30 minutes including DC lighting.
TEMPERATURE CORRECTION FACTOR	As per manufacturer's data.

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ANNEXURE-III

DOCUMENTS REQUIRED ALONG WITH THE TECHNICAL OFFER

i. Capability / discharge curve, temperature correction factor, float charging factor & published technical catalogue for considered factors.
ii. Unpriced Price Schedule as enclosed with NIT with “Quoted” word against items with bidder’s signature and company stamp.
iii. A copy of the sheet “Compliance certificate” with bidder’s signature and company stamp.
iv. A copy of sheet “Data Sheet-A” with required information and bidder’s signature and company stamp.

SECTION - II

STANDARD TECHNICAL REQUIREMENTS

CLAUSE NO.	TECHNICAL REQUIREMENTS
2.07.00	D.C. Systems Complete DC system, comprising of batteries, battery charges, relays, contactors, timers etc shall be suitable for continuous operation at the maximum continuous float voltage including suitable temperature correction factors. The battery sizing shall be done based on different types of continuous and intermittent loads including motor starting (wherever applicable) under complete blackout condition, for the duration specified so as to meet the system requirement (30 minutes minimum). All intermittent loads shall be considered with minimum 1 minute duration. The battery shall be sized considering a minimum electrolyte temperature of 15Deg C along with temperature correction factors as per relevant standard. An ageing factor of 1.25 shall be considered. The no. of cells and end cell voltage shall be considered based on the minimum and maximum voltage window and cable drop etc. as per system requirement.

CLAUSE NO.	TECHNICAL REQUIREMENTS

Each system shall comprise of two nos. of batteries and two nos. of float-cum-boost chargers each rated for 100% capacity. DC scheme shall ensure that each critical consumer is fed from two different bus sections. DCDBs shall provide adequate number of feeders on each section.

Boost/ fast charging time shall be as per worst operating condition and would satisfy technical requirements recommended by battery manufacturer. Each battery charger must be capable of supplying all the continuous D.C. loads (fed through both section of DCDB) plus the trickle charging current of both the batteries. In addition, each charger must have sufficient surplus capacity for running of the largest D.C auxiliary so that the battery is not drained during testing of the same. Battery charger should also be capable of boost/ fast charge the battery from completely discharged condition to fully charged condition without imposing any limitations under worse operating conditions. Battery size shall be as per the following:

Area	**DC Voltage**	**Load**	**Minimum Battery Bank Rating**
FGD	220 V	supply total DC load of the associated area at an acceptable voltage for at least 30 minutes including DC Lighting	150AH for lead acid Plante type /90 AH for Ni-Cd High Discharge (KPH) type batteries

CLAUSE NO.	TECHNICAL REQUIREMENTS

BATTERY

1.00.00 BATTERY RATINGS

1.	**For Ni-Cd Type Battery**	
a)	Battery Voltage	220V/110V/48 V DC
b)	No. of Cells	As per Sizing Calculations
c)	Battery type	Stationary Nickel-Cadmium Pocket Plate High discharge type (KPH)
d)	Capacity for five(5)hour rate	As per requirement
e)	Nominal discharge voltage per Cell	1.2 V
f)	Float voltage	As per manufacturer's standards for float application
2.	**For Lead Acid Plante type Battery**	
a)	Battery Voltage	220V/110V/48 V DC
b)	No. of Cells	As per Sizing Calculations
c)	Battery type	Stationary Lead Acid Plante high discharge type
d)	Capacity for ten(10)hour rate	As per requirement
e)	Nominal voltage per cell discharge	2.0 V
f)	Float Voltage	As per manufacturer's standards for float application

1.01.00 **Commissioning of Battery**

Commissioning of each battery at site shall only be carried out either by the battery manufacturer himself or under the supervision of the battery manufacturer.

CLAUSE NO.	TECHNICAL REQUIREMENTS
PART-A:	**NICKEL-CADMIUM BATTERY**
2.00.00	**CODES AND STANDARDS**
2.01.00	All standards, specifications and codes of practice referred to herein, shall be the latest editions including all applicable official amendments and revisions as on date of opening of techno-commercial bid. In case of conflict between this specification and those (IS codes, Standards etc.) referred to herein, the former shall prevail. All works shall be carried out as per the following standards and codes: IEC 60623 / IS 10918 Specification for vented type Nickel Cadmium Batteries. IS 1069 Quality tolerances for water for storage batteries IEC 60993 Electrolyte for vented Nickel-Cadmium cells Indian electricity rules Indian Electricity Acts
2.02.00	Equipment complying with other internationally accepted standards such as IEC., BS, VDE etc. will also be considered if they ensure performance and constructional features equivalent or superior to standards listed above. In such a case, the Bidder shall clearly indicate the standard(s) adopted, furnish a copy in English of the latest revision of the standards along with copies of all official amendments and revisions in force as on date of opening of techno-commercial bid and shall clearly bring out the salient features for comparison.
3.00.00	**GENERAL TECHNICAL REQUIREMENT**
3.01.00	Equipments (a.) DC Batteries shall be stationary Nickel Cadmium Pocket plate type (KPH)/ (KPL) conforming to IS 10918. The batteries shall be high discharge performance type as specified. For the purpose of design an ambient temperature of 50 degree centigrade and relative humidity of 85% shall be considered. (b.) DC batteries shall be suitable for standby duty. The batteries shall normally be permanently connected to the load in parallel with a charger and shall supply the load during emergency conditions when AC supplies are lost. Batteries shall be suitable for a long life under continuous float operations and occasional discharges. The batteries shall be boost charged at about 1.54 to 1.7 volts per cell maximum and float charged at about 1.42 V/cell.

CLAUSE NO.	TECHNICAL REQUIREMENTS
	(c.) Batteries should be suitable for continuous operation for the maximum ambient temperature as defined in technical parameters.
3.02.00	Construction Features
3.02.01	Containers Containers shall be made of polypropylene plastic material. Containers shall be robust, heat resistance, leak proof, non absorbent, alkali resistant, non-bulging type and free from flaws, such as wrinkles, cracks, blisters, pin holes etc. Electrolyte level lines shall be marked on container in case of translucent containers.
3.02.02	Vent Plugs Vent plugs shall be provided in each cells. They shall be anti-splash type, having more than one exit hole shall allow the gases to escape freely but shall prevent alkali from coming out. The design shall be such that the water loss due to evaporation is kept to minimum. In addition the ventilator shall be easily removed for topping up the cells and of such dimensions that the syringe type hydrometer can be inserted into the vent to take electrolyte samples.
3.02.03	Plates The plates shall be designed for maximum durability during all service conditions including high rate of discharge and rapid fluctuations of load. The construction of plates shall conform to latest revisions of IS 10918. The separators shall maintain the electrical insulation between the plates and shall allow the electrolyte to flow freely. Separators should be suitable for continuous immersion in the electrolyte without distortion. The positive and negative terminal posts shall be clearly marked.
3.02.04	Sediment Space Sufficient sediment space shall be provided so that cells will not have to be cleaned during normal life and prevent shorts within the cells.
3.02.05	Electrolyte The electrolyte shall be prepared from battery grade potassium hydroxide conforming to IEC 60993. The cells can be shipped either in charged condition or in dry condition. Necessary electrolyte for make-up shall be supplied separately.

CLAUSE NO.	TECHNICAL REQUIREMENTS
3.02.06	Connectors and Fasteners Nickel plated copper connectors shall be used for connecting adjacent cells and PVC insulated flexible copper cables shall be used for inter-row / inter-tier / inter-bank connections. Bolts, nuts and washers shall be Stainless Steel / Nickel coated steel to prevent corrosion. The thickness of Nickel coating of connectors should be not less than 0.02 mm. All the terminals and cells inter-connectors shall be fully insulated or have insulation shrouds. End take off connections from positive and negative poles of batteries shall be made by single core cables having stranded AL conductors and XLPE insulation. Necessary supports and lugs for termination of these cables on batteries shall also be supplied by the contractor. All connectors and lugs shall be capable of continuously carrying the 30 minutes discharge current of the respective batteries and through fault short circuit current which the battery can produce and withstand for the period declared. Contractor shall furnish necessary sizing calculations to prove compliance to the same. Suitable number of Inter-rack connectors shall be supplied by the Bidder to suit the battery room layout during detailed engineering.
3.02.07	Battery racks Mild steel racks for all the batteries shall be provided. They shall be free standing type mounted on porcelain/hard rubber/PVC pads insulators/High impact plastic insulators. Batteries shall preferably be located in the single tier arrangement. However, batteries having a complete cell weight of lower than 50 Kg could be located in the double tier arrangement. The batteries racks and supports for cable termination shall be coated with three (3) coats of anti-alkali paint of approved shade. Name plates, resistant to alkali, for each cell shall be attached on to the necessary racks. The bottom tier of the stand shall not be less than 150 mm above the floor. Wherever racks are transported in dismantled conditions, match markings shall be provided to facilitate easy assembly.
3.02.08	Manufacturer's Identification System The following information shall be indelibly marked on outside of each cell. (a.) Manufacturers' name and trade marks (b.) Country and year of manufacture. (c.) Manufacturer type designation. (d.) AH capacity at 5 hour discharge rate.

CLAUSE NO.	TECHNICAL REQUIREMENTS
	(e.) Serial number
4.00.00	**THE FOLLOWING INFORMATION SHALL BE GIVEN ON THE INSTRUCTION CARDS SUPPLIED WITH THE BATTERY:**
	(a.) Manufacturer's instructions for filling and initial charging of the battery together with starting and finishing charging rate.
	(b.) Maintenance instructions.
	(c.) Designation of cell in accordance with IS 10918.
	(d.) Storing conditions of electrolyte.
5.00.00	**TESTS**
5.01.00	All equipment to be supplied shall be of type tested design. During detail engineering, the contractor shall submit for Owner's approval the reports of all the type tests as listed in this specification and carried out within last ten years from the date of techno-commercial bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.
5.02.00	However, if the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of techno-commercial bid opening, 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 to the owner either at third party lab or in presence of client/owners representative and submit the reports for approval.
5.03.00	All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.
5.04.00	The type test reports once approved for any projects shall be treated as reference. For subsequent projects of NTPC, an endorsement sheet will be furnished by the manufacturer confirming similarity and “No design change”. Minor changes if any shall be highlighted on the endorsement sheet.
5.05.00	GENERAL The Contractor shall submit for Owner’s approval the reports of all the type tests carried out as per latest IS-1146 (for all applicable tests for containers) / IS-10918 (for Ni-Cd batteries). The complete type test reports shall be for any rating of battery in a particular group, based on plate dimensions being manufactured by supplier.

1) For Sipat FGD: 05.03.2021
2) For Kahalgaon FGD: 21.10.2019

CLAUSE NO.	TECHNICAL REQUIREMENTS
5.06.00	Routine and Acceptance tests shall be as per Quality Assurance & Inspection table of battery.
5.07.00	Commissioning Checks: All tests as listed below shall be carried out on sample cell selected at random by the employer at site after completion of installation. (a.) Physical Examination (b.) Dimensions, Mass & layout (c.) MARKING (d.) Polarity and absence of short circuit. (e.) Ampere - hour capacity--4 Cycles (f.) Insulation resistance The Contractor shall arrange for all necessary equipment, including the variable resistor, tools, tackles and instruments.

CLAUSE NO.	TECHNICAL REQUIREMENTS
PART-B:	**LEAD –ACID PLANTE BATTERY**
6.00.00	**CODES & STANDARDS**
6.01.00	All standards, specification and codes of practice, referred to herein, shall be the latest edition including all applicable official amendments and revisions as on date of opening of techno-commercial bid. In case of conflict between this specification and those (IS Codes Standards etc.) referred to herein, the former shall prevail. All works shall be carried out as per the following standards and codes: IEC 60896 Stationary Lead-Acid Batteries IS 266 Specification for sulphuric acid IS 1069 Specification for water for storage batteries IS 1146 Specification for rubber & plastic containers for lead acid storage batteries. IS 1652 Specification for stationary cells and batteries, lead acid type (with plante positive plates). IS 3116 Specification for sealing compound for lead acid batteries. IS 8320 General requirements and methods of tests for lead acid storage batteries. IS 6071 Specification for synthetic separators for lead acid batteries. Indian Electricity Rules Indian Electricity Acts
6.02.00	Equipment complying with other internationally accepted standards such as IEC, BS, VDE etc. will also be considered if they ensure performance and constructional features equivalent or superior to standards listed above. In such a case, the Bidder shall clearly indicate the standard(s) adopted, furnish a copy in English of the latest revision of the standards alongwith copies of all official amendments and revisions in force as on date of opening of techno-commercial bid and shall clearly bring out the salient features for comparison.

CLAUSE NO.	TECHNICAL REQUIREMENTS
7.00.00	**GENERAL TECHNICAL REQUIREMENTS**
7.01.00	Equipments DC Batteries shall be stationary lead acid Plante positive plate type conforming to IS 1652. The battery shall be high discharge performance type. For the purpose of design an ambient temperature of 50 degree centigrade and relative humidity of 85% shall be considered. DC Batteries shall be suitable for standby duty. The Batteries shall normally be permanently connected to the load in parallel with a charger and shall supply the load during emergency conditions when AC supplies are lost. Batteries shall be suitable for a long life under continuous float operations and occasional discharges. The batteries shall be boost charged at about 2.7 volts per cell maximum and float charged at about 2.25 V/cell: Batteries should be suitable for continuous operation for the maximum ambient temperature as defined in technical parameters.
7.02.00	Construction Features
7.02.01	Containers Containers shall be made of transparent glass, hard rubber, suitable robust, heat resistance, leak proof, non absorbent, acid resistant, non-bulging type and free from flaws, such as wrinkles, cracks, blisters, pin holes etc. Electrolyte level lines shall be marked on container in case of transparent containers. Float type level indicator shall be provided in case of opaque containers. The stem portion of the float should be long enough to prevent falling of the float inside the container even if there is no electrolyte in the container. The marking for the electrolyte level should be for the upper and lower limits. The material of level indicator shall be acid proof and oxidation proof. Container shall be closed/sealed lid type. Lid and sealing compound shall be non-cracking type. The container made of hard rubber and plastics shall be type tested as per IS 1146. All type tests shall be carried out for sealing compound as per IS 3116. The pole sealing arrangement should be such that no acid particle get entrapped due to acid creep as a result of capillary action and it should be possible to remove and refix the sealing to carry out the maintenance.
7.02.02	Vent Plugs Vent plugs shall be provided in each cells. They shall be antis-plash type, having more than one exit hole shall allow the gases to escape freely but shall prevent acid from coming out. The design shall be such that the water loss due to evaporation is kept to minimum. In addition the ventilator shall be easily removed for topping up the

CLAUSE NO.	TECHNICAL REQUIREMENTS
	cells and of such dimensions that the syringe type hydrometer can be inserted into the vent to take electrolyte sample.
7.02.03	Plates The plates shall be designed for maximum durability during all service conditions including high rate of discharge and rapid fluctuations of load. The construction of plates shall conform to latest revisions of IS 1652 as applicable. The separators shall maintain the electrical insulation between the plates and shall allow the electrolyte to flow freely. Separators should be suitable for continuous immersion in the electrolyte without distortion. The positive and negative post shall be clearly marked.
7.02.04	Sediment Space Sufficient sediment space shall be provided so that cells will not have to be cleaned during normal life and prevent shorts within the cells.
7.02.05	Cell Insulator Each cell shall be separately supported on PVC/porcelain/hard rubber insulators fixed on the racks with adequate clearance between adjacent cells. Minimum distance between adjacent cells shall be more than the bulge allowed for two cells in accordance with IS 1146.
7.02.06	Electrolyte The electrolyte shall be prepared from battery grade sulphuric acid conforming to IS 266 and distilled water conforming to IS 1069. The cells shall be shipped dry uncharged. The electrolyte shall be supplied separately.
7.02.07	Connectors and Fasteners Lead or Lead coated copper connectors shall be used for connecting up adjacent cells and rows. Bolts, nuts and washers shall be effectively lead coated to prevent corrosion. The thickness of lead-coating of connectors should not be less than 0.025 mm. The lead coating thickness shall be measured in accordance with APPENDIX F of IS 6848 (latest edition). All the terminals and cells inter-connectors shall be fully insulated or have insulation shrouds. End take off connections from positive and negative poles of batteries shall be made by single core cables having stranded copper conductors and PVC insulation. Necessary supports and lugs for termination of these cables on batteries shall also be supplied by the contractor. All connectors and lugs shall be capable of continuously carrying the 30 minutes discharge current of the respective Batteries and through fault short circuit current which the battery

CLAUSE NO.	TECHNICAL REQUIREMENTS

can produce and withstand for the period declared. Contractor shall furnish necessary sizing calculations to prove compliance to the same.

7.02.08 Battery racks

Wooden racks for all the batteries shall be provided. These racks shall be made of good quality first class seasoned teak wood in line with CPWD specification. They shall be free standing type mounted on porcelain/hard rubber/PVC pads insulators/High impact plastic insulators. Batteries shall preferably be located in the single tier arrangement. However, batteries having a complete cell weight of lower than 50 Kg could be located in the double tier arrangement. The batteries rack and wooden support for cable termination shall be coated with three (3) coats of anti-acid paint of approved shade. Numbering tags, resistant to acid, for each cell shall be attached on to the necessary racks. The bottom tier of the stand shall not be less than 150 mm above the floor. Wherever racks are transported in dismantled condition, suitable match markings shall be provided to facilitate easy assembly.

7.02.09 Manufacturer's Identification Systems

The following information shall be indelibly marked on outside of each cell.

(a.) Manufacturer's name and trade marks

(b.) Country and year of manufacture.

(c.) Manufacturer type designation.

(d.) AH capacity at 10 hour discharge rate.

(e.) Serial number

8.00.00 TESTS

8.01.00 All equipment to be supplied shall be of type tested design. During detail engineering, the contractor shall submit for Owner's approval the reports of all the type tests as listed in this specification and carried out within last ten years from the date of techno-commercial bid opening. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.

8.02.00 However if the contractor is not able to submit report of the type test(s) conducted within last ten years from the date of techno-commercial bid opening, 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 to the owner either at third party lab or in presence of client/owners representative and submit the reports for approval.

CLAUSE NO.	TECHNICAL REQUIREMENTS
8.03.00	All acceptance and routine tests as per the specification and relevant standards shall be carried out. Charges for these shall be deemed to be included in the equipment price.
8.04.00	The type test reports once approved for any projects shall be treated as reference. For subsequent projects of NTPC, an endorsement sheet will be furnished by the manufacturer confirming similarity and “No design change”. Minor changes if any shall be highlighted on the endorsement sheet.
8.05.00	GENERAL The Contractor shall submit for Owner’s approval the reports of all the type tests carried out as per latest IS-1146 (for rubber & plastic containers for lead-acid storage batteries)/IS 1652 (for lead-acid plante batteries). The complete type test reports shall be for any rating of battery in a particular group, based on plate dimensions being manufactured by supplier.
8.06.00	Routine and Acceptance tests shall be as per Quality Assurance & Inspection table of battery.
8.07.00	Commissioning Checks: All tests as listed below shall be carried out on sample cell selected at random by the employer at site after completion of installation. 1) Verification of markings. 2) Verification of dimensions. 3) Test for capacities for 10 hrs discharge rate alongwith the test for voltage during discharge. The Contractor shall arrange for all necessary equipment, including the variable resistor, tools, tackles and instruments.

Note : NTPC approved QAP available with vendor for any previous projects shall also be accepted.

	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.02	DATE:-03/11/2020
		PROJECT			P.O NO.:-	DATE:-
		ITEM:- DC NI-CD BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 1 OF 7

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	C/N					**			
											M	C	N	
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 Acid	Chemical	MA	Chemical	1 Sample/Batch	-	-do-	-do-	-do-	√	P/V	V	-	
e)	HV Test	Electrical	MA	Electrical	3 Sample/Batch	-	-do-	-do-	-do-	√	P/V	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	**TERMINAL POST**													
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	-	
b)	Material Conformance	Chemical	CR	Chemical	1 Sample/Batch	-	As per IS-2062	IS-2062	Manufacturer's TC	√	P	V	-	External Report
c)	Thread size depth & chamfer	Physical	MA	Measurement & Visual	1 Sample/Batch	-	-do-	-do-	-do-	√	P	V	-	
d)	Surface finish & defects	Visual	MA	Visual	100%	-	Manufacturer's Drg./ Std.	Manufacturer's Drg./ Std.	Inspection Report	√	P	V	-	
e)	Plating Quality	Physical/ Visual	CR	Visual & Thickness	Sampling as per IS-2500(1)-2000, S-3 Level	-	-do-	-do-	Plating Report	√	P	V	-	
1.3	**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	√	P/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	

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Prepared By		Kanhaiya Kumar	Prepared By		Kunal Gandhi			Reviewed By			
Checked By		Manish Shukla	Checked By		Ritesh K Jaiswal			Checked By			

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RITESH KUMAR JAISWAL

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.02	DATE:-03/11/2020
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- DC NI-CD BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 2 OF 7

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	C/N					**			
											M	C	N	
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
1.4	**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	-	
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	-	-	
1.5	**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.
1.6	**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	-	-	
1.7	**STRIPS**													
a)	Plating Quality including thickness	Dimension	CR	Measurement	1 sample/ coil	-	Manufacturer's Drg./ Std.	Manufacturer's Drg./ Std.	Inspection Report	√	P	V	V	Nickel plating thickness of steel strip will be as per vendor specific design, meeting cell capacity and other technical parameters of the spec

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Prepared By		Kanhaiya Kumar	Prepared By		Kunal Gandhi			Reviewed By			
Checked By		Manish Shukla	Checked By		Ritesh K Jaiswal			Checked By			

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	CUSTOMER			QP NO.:-PE-QP-999-508-E004, REV.02	DATE:-03/11/2020
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- DC NI-CD BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 3 OF 7

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	C/N					**			
											M	C	N	
2.0	**IN-PROCESS**													
2.1	**BRIQUETTE FORMATION**													
a)	Visual Checks for Empty Pockets	Visual	CR	Measurement	100%	-	Manufacturer's Drg./ Std.	Manufacturer's Drg./ Std.	Inspection Report	√	P	V	V	
b)	Weight Check	Visual	CR	Measurement	Sample	-	-do-	-do-	-do-	√	P	V	V	
2.2	**PLATE BLANK MANUFACTURING**													
a)	Dimesional Conformance	Visual	MA	Measurement	10 Sample/Batch	-	Manufacturer's Drg./ Std.	Manufacturer's Drg./ Std.	Process Quality Report	√	P	V	V	
b)	Absence of Defects	Visual	MA	Measurement	100%	-	-do-	-do-	-do-	√	P	V	V	Empty Pockets not Allowed in any Form
2.3	**PLATE ASSEMBLY**													
a)	Dimesional Conformance	Visual	MA	Measurement (Thick. & Width)	5 Sample/Batch	-	Manufacturer's Drg./ Std.	Manufacturer's Drg./ Std.	Process Quality Report		P	-	-	
b)	Quality of Spot Welding	Visual	MA	Visual Inspection	100%	-	-do-	-do-	-do-		P	-	-	
2.4	**PLATE BLOCK ASSEMBLY**													
a)	Assembly Correctness of +Ve & -Ve Groups	Visual	MA	Visual	100%	-	Manufacturer's Drg./ Std.	Manufacturer's Drg./ Std.	Process Quality Report		P	-	-	
b)	Correctness of Insulation grid	Visual	MA	Visual	100%	-	-do-	-do-	-do-		P	-	-	
c)	Tightness of Stack	Visual	MA	Visual	100%	-	-do-	-do-	-do-		P	-	-	
d)	Plate Block Tightness	Physical	CR	Measurement	100%	-	-do-	-do-	-do-		P	-	-	
e)	Position of Terminals	Visual	MA	Gauging	100%	-	-do-	-do-	-do-		P	-	-	
f)	Dimensional Conformance	Visual	MA	Measurement	100%	-	-do-	-do-	-do-		P	-	-	
2.5	**FORMATION ASSEMBLY**													
a)	Function/ Capacity	Measurement	CR	Charging & Discharging	100%	-	Manufacturer's Drg./ Std.	Manufacturer's Drg./ Std.	Test Report	√	P	V	V	
2.6	**CELL ASSEMBLY**													
a)	Correctness of Plate Block	Visual	MA	Visual	100%	-	Manufacturer's Drg./ Std.	Manufacturer's Drg./ Std.	Process Quality Report	√	P	V	V	
b)	Position of Inner Sealing Parts	Visual	MA	Visual	100%	-	-do-	-do-	-do-		P	-	-	
c)	Lock Washer Fitment	Visual	MA	Visual	100%	-	-do-	-do-	-do-		P	-	-	

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Prepared By		Kanhaiya Kumar	Prepared By		Kunal Gandhi			Reviewed By			
Checked By		Manish Shukla	Checked By		Ritesh K Jaiswal			Checked By			

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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.02	DATE:-03/11/2020
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- DC NI-CD BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 4 OF 7

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	C/N					**			
											M	C	N	
d)	Polarity of Terminals	Visual & Measurement	CR	Voltage Checking according to Polarity Marking	100%	-	Manufacturer's Drg./ Std.	Manufacturer's Drg./ Std.	Process Quality Report	√	P	V	V	
e)	Soundness of Sealing & Welding	Visual & Measurement	MA	Pneumatic Pressure Test	100%	-	-do-	-do-	-do-	√	P	V	V	In case of Leakage, Bubble, the Container is rejected
f)	Cell Identification	Visual	MA	Visual	100%	-	-do-	-do-	-do-	√	P	V	V	
3.0	**IN-PROCESS(CHEMICAL CONTROL)**													
3.1	**POTTASSIUM HYDROXIDE (SOLID KOH)**													
a)	Determination of Assay(KOH)	Chemical	MA	Quantitative Analysis	As per Chemical supplier Instruction	-	IEC-60993/IS-6831	Analysis Report	Manufacturer's TC		P	-	-	External Report
b)	Determination of K2Co3	Chemical	MA	-do-	-do-	-	-do-	-do-	-do-		P	-	-	-do-
c)	Determination of KCL	Chemical	MA	-do-	-do-	-	-do-	-do-	-do-		P	-	-	-do-
3.2	**LITHIUM HYDROXIDE (SOLID LIOH)**													
a)	Determination of Assay(LIOH) H2O	Chemical	MA	Quantitative Analysis	As per Chemical supplier Instruction	-	IEC-60993	Analysis Report	Manufacturer's TC		P	-	-	External Report
b)	Determination of Li2Co3	Chemical	MA	Quantitative Analysis	-do-	-	-do-	-do-	-do-		P	-	-	-do-
c)	Determination of LiCL	Chemical	MA	Quantitative Analysis	-do-	-	-do-	-do-	-do-		P	-	-	-do-
d)	Determination of Other Impurities	Chemical	MA	Quantitative Analysis	-do-	-	-do-	-do-	-do-		P	-	-	-do-
3.3	**DI WATER PREPARATION**													
a)	Determination of Chlorides	Chemical	MA	Quantitative Analysis	As per Chemical supplier Instruction	-	IEC-60993	Analysis Report	Manufacturer's TC		P	-	-	External Report
b)	Sulpahtes	Chemical	MA	Quantitative Analysis	-do-	-	-do-	-do-	-do-		P	-	-	-do-
c)	Nitrates	Chemical	MA	Quantitative Analysis	1 Sample	-	-do-	-do-	-do-		P	-	-	-do-
d)	Silicons	Chemical	MA	Quantitative Analysis	1 Sample	-	-do-	-do-	-do-		P	-	-	-do-

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Prepared By		Kanhaiya Kumar	Prepared By		Kunal Gandhi			Reviewed By			
Checked By		Manish Shukla	Checked By		Ritesh K Jaiswal			Checked By			

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RITESH KUMAR JAISWAL

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.02	DATE:-03/11/2020
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- DC NI-CD BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 5 OF 7

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	C/N					**			
											M	C	N	
e)	Aluminium	Chemical	MA	Quantitative Analysis	1 Sample	-	IEC-60993	Analysis Report	Manufacturer's TC		P	-	-	External Report
f)	Calcium, Magnesium	Chemical	MA	Quantitative Analysis	1 Sample	-	-do-	-do-	-do-		P	-	-	-do-
g)	Organic Impurities	Chemical	MA	Quantitative Analysis	1 Sample	-	-do-	-do-	-do-		P	-	-	-do-
h)	PH	Chemical	MA	Quantitative Analysis	1 Sample/day	-	-do-	-do-	-do-	√	P	V	V	-do-
i)	Conductivity	Chemical	MA	Quantitative Analysis	1 Sample/day	-	-do-	-do-	-do-	√	P	V	V	-do-
3.4	**TYPE-B ELECTROLYTE PREPARTION**													
a)	Specific Gravity	Chemical	CR	Hydrometeric Test	1 Sample/Batch	-	As per Chemical Supplier Instruction	As per Chemical Supplier Instruction	Manufacturer's TC	√	P	V	V	External Report
3.5	**ELECTROLYTE TYPE B22 HAVING LIOH 55% PURITY (i.e. 40gms/litre) WILL BE USED FOR FIRST FILLING**													
a)	Determination of Carbonisation gms/Ltr.	Chemical	CR	Quantitative Analysis	1 Sample/Batch	-	IEC-60993	As per Chemical Supplier Instruction	Manufacturer's TC	√	P	V	V	External Report
b)	Determination of Chlorides	Chemical	MA	Quantitative Analysis	1 Sample/Batch	-	-do-	-do-	-do-	√	P	V	V	-do-
c)	Determination of Sulphates	Chemical	MA	Quantitative Analysis	1 Sample/Batch	-	-do-	-do-	-do-	√	P	V	V	-do-
c)	Determination of Lithium Hydroxide (LIOH)	Chemical	MA	Quantitative Analysis	1 Sample/Batch	-	-do-	-do-	-do-	√	P	V	V	-do-
4.0	**FINISHED BATTERY**													
	Note: Before Start of Inspection, Manufacturer Internal Inspection Record(QC) of the offered Batteries to be Verified													
4.1	**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	
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

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RITESH KUMAR JAISWAL

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.02	DATE:-03/11/2020
	PROJECT			P.O NO.:-	DATE:-
	ITEM:- DC NI-CD BATTERY		SYSTEM:- DC SYSTEM	SECTION:-	SHEET 6 OF 7

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	C/N					**			
											M	C	N	
4.2	**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 'C' and 'N' 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	
4.3	**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	

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	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared By		Kanhaiya Kumar	Prepared By		Kunal Gandhi			Reviewed By			
Checked By		Manish Shukla	Checked By		Ritesh K Jaiswal			Checked By			

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RITESH KUMAR JAISWAL

BHEL (logo)	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.02	DATE:-03/11/2020
		PROJECT	P.O NO.:-	DATE:-
		ITEM:- DC NI-CD BATTERY / SYSTEM:- DC SYSTEM	SECTION:-	SHEET 7 OF 7

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	C/N					**			
											M	C	N	
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	
5.0	**BATTERY RACKS**	Visual & Dimension	MA	Visual & Dimension	1 Sample	1 Sample	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	V	
6.0	**ACCESSORIES**	Visual & Dimension	MA	Visual & Dimension	100%	100%	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	-	
7.0	**CABLE LUGS AND TERMINAL PLATE**	Visual	MA	Visual	100%	100%	Approved drg/ doc	Approved drg/ doc	-do-	√	P	W	-	
8.0	**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.
2. BHEL Reserves the right for conducting repeat test, if required.
3. Photographs of complete Battery Package items after packaging to be sent to BHEL-Purchase Group for review before issuing MDCC.
4. In case, any changes in QAP commented by customer at contract stage shall be carried out by bidder without any implication to BHEL/Customer.
5. Project Specific QAP to be developed based on customer requirement. .
6. For Export Job, BHEL technical specification for sea worthy packing to be followed.
7. Packing shall be suitable for storage at site in tropical climate conditions.

LEGEND :

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

** **M:** SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **C**: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **N:** 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		Kunal Gandhi	Seal		Reviewed By			
Checked By		Manish Shukla	Checked By		Ritesh K Jaiswal			Checked By			

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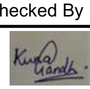
Date: 2020.12.01 17:54:58 +05'30'



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Date: 2020.12.02 09:44:23 +05'30'

ANNEXURE-A

STANDARD QUALITY PLAN
STANDARD QP NO. : PE-QP-999-508-E004, REV. 02

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	NO	*YES
		• Insulation Resistance	IS:10918	NO	*YES
		• Ampere-hour capacity	IS:10918	NO	*YES
		• Retention of Charge	IS:10918	NO	*YES
		• Test for discharge performance at low temp.	IS:10918	NO	*YES
		• Life Cycle Test	IS:10918	NO	*YES
		• Dielectric Test	IS:10918	NO	*YES
		• Storage Test	IS:10918	NO	*YES

1) For Sipat FGD: 05.03.2021
2) For Kahalgaon FGD: 21.10.2019

NOTES: (*)
1) Type test reports to be submitted which should be carried out within last 10 years from the date of techno commercial bid opening

2) All equipment to be supplied shall be of type tested design. During detail engineering, the contractor shall submit for Owner's approval the reports of all the type tests as listed in this specification and carried out within last ten years from the indicated date. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.
3) However, if the contractor is not able to submit report of the type test(s) conducted within last ten 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 to the owner either at third party lab or in presence of client/owners representative and submit the reports for approval.

Note : NTPC approved QAP available with vendor for any previous projects shall also be accepted.

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER			QP NO.:-PE-QP-999-508-E002, REV.01	DATE:- 30/06/2020
	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	C/N					**			
											M	C	N	
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)	Visual	Visual	MA	Visual	Random Sample	-	IS:1652 & MFR's Std.	IS:1652 & MFR's Std.	Test Cert.	√	P	V	-	
b)	Physical	Physical	MA	Physical	Random Sample	-	-do-	-do-	-do-	√	P	V	-	
c)	Chemical	Chemical	MA	Chemical	Random Sample	-	(For Synthetic IS : 6071)	(For Synthetic IS : 6071)	-do-	√	P	V	-	
d)	Electrical Resistance Test	Electrical	MA	Electrical	Random Sample	-	-do-	-do-	-do-	√	P/V	V	-	
e)	Acceptance test Dimension, Volume Porosity, Wettability of separator	Test	MA	Test	Random Sample	-	-do-	-do-	-do-	√	P	V	-	
1.3	**TERMINAL POST**													
a)	Dimensional Conformance	Dimension	MA	Measurement	Random Sample	-	IS:1652, IS:8320 & MFR's Std.	IS:1652, IS:8320 & MFR's Std.	Test Cert.	√	P	V	-	
b)	Material Conformance	Chemical	CR	Chemical	Random Sample	-	-do-	-do-	-do-	√	P	V	-	
c)	Thread size depth & chamfer	Physical	MA	Measurement	Random Sample	-	-do-	-do-	-do-	√	P	V	-	
d)	Surface finish & defects	Visual	MA	Visual	100%	-	-do-	-do-	-do-	√	P	V	-	
e)	Plating Quality	Thickness	CR	Measurement	Random Sample	-	-do-	-do-	-do-	√	P	V	-	
1.4	**CONNECTOR**													
a)	Dimension	Dimension	MA	Measurement	Random Sample	-	IS:1652, IS:6848 & Appd. Drg./Doc.	IS:1652, IS:6848 & Appd. Drg./Doc.	Test Cert.	√	P/V	V	V	
b)	Thickness of lead coating	Thickness	CR	Measurement	Random Sample	-	-do-	-do-	-do-	√	P/V	V	V	
1.5	**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.*

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		Kunal Gandhi			Reviewed By			
Checked By		Manish Shukla	Checked By		Ritesh K Jaiswal			Checked By			

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Date: 2020.08.28 16:10:07 +05'30'

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
		CUSTOMER			QP NO.:-PE-QP-999-508-E002, REV.01	DATE:- 30/06/2020
		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	C/N					**			
											M	C	N	
1.6	**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	-	
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 'C' and 'N' 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	Seal			Sign & Date	Name	Seal
Prepared By		Kanhaiya Kumar	Prepared By		Kunal Gandhi			Reviewed By			
Checked By		Manish Shukla	Checked By		Ritesh K Jaiswal			Checked By			

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Date: 2020.08.28 14:48:29 +05'30'

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Date: 2020.08.28 15:12:51 +05'30'

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Digitally signed by RITESH KUMAR JAISWAL
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Date: 2020.08.28 16:12:30 +05'30'

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN			SPEC NO.:-PE-TS-XXX-508-E001	DATE:-
	CUSTOMER			QP NO.:-PE-QP-999-508-E002, REV.01	DATE:- 30/06/2020
	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	C/N					**			
											M	C	N	
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.
2. BHEL Reserves the right for conducting repeat test, if required.
3. Photographs of complete Battery Package items after packaging to be sent to BHEL-Purchase Group for review before issuing MDCC.
4. In case, any changes in QAP commented by customer at contract stage shall be carried out by bidder without any implication to BHEL/Customer.
5. Project Specific QAP to be developed based on customer requirement. .
6. For Export Job, BHEL technical specification for sea worthy packing to be followed.
7. Packing shall be suitable for storage at site in tropical climate conditions.

LEGEND :-

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

** **M:** SUPPLIER/ MANUFACTURER/ SUB-SUPPLIER, **C**: MAIN SUPPLIER/ BHEL/ THIRD PARTY INSPECTION AGENCY, **N:** 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		Kunal Gandhi			Reviewed By			
Checked By		Manish Shukla	Checked By		Ritesh K Jaiswal			Checked By			

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Date: 2020.08.28 16:13:00 +05'30'

ANNEXURE-A

QUALITY PLAN
STANDARD QP NO. : PE-QP-999-508-E002, REV. 01

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	NO	*YES
		• AH & WH efficiency Test	IS:1652	NO	*YES
		• Test for loss of capacity on storage (Retension of Charge)	IS:1652	NO	*YES
		• Endurance Test	IS:1652	NO	*YES
		• Loss of water test	IS:1652	NO	*YES
		• Test for suitability for floating batteryoperation	IS:1652	NO	*YES
		• Internal resistance and short circuit test	IS:1652	NO	*YES

1) For Sipat FGD: 05.03.2021
2) For Kahalgaon FGD: 21.10.2019

NOTES: (*)
1) Type test reports to be submitted which should be carried out within last 10 years from the date of techno commercial bid opening

2) All equipment to be supplied shall be of type tested design. During detail engineering, the contractor shall submit for Owner's approval the reports of all the type tests as listed in this specification and carried out within last ten years from the indicated date. These reports should be for the test conducted on the equipment similar to those proposed to be supplied under this contract and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.
3) However, if the contractor is not able to submit report of the type test(s) conducted within last ten 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 to the owner either at third party lab or in presence of client/owners representative and submit the reports for approval.

Delivery Schedule

Package Code	Package name	DEPTT	BHEL Drawing No	Drawing Title	Primary/Secondary	BHEL Inputs	Drg Sch for Vendors	Standard Delivery Terms for Supply Portion
508-11000-A 508-13000-A 508-14000-A	DC LEAD ACID BATTERIES DC Ni Cd BATTERIES DC LEAD ACID/Ni Cd BATTERIES	ELECT	PE-V0-XXX-508-E102	GA AND BATTERY ROOM LAYOUT OF BATTERY BANK	Primary	Battrey Room Layout will be provided by BHEL within 07 days of PO Placement	R-0 within 14 days from BHEL input & subsequent revisions within 10 days of comments received from BHEL.	Note : Delivery applicable for both the purchase orders pertaining to Main Supply of battery along with accessories. Delivery completion for PO Quantity shall be “270” days from PO date. Supplier to complete the package engineering in time and get the applicable engineering Drgs. /docs approved from BHEL/End Customer before start of manufacturing and supply. For Electrolyte - Within Thirty (30) days from the date of BHEL clearance. Clearance may be issued by BHEL lot-wise/unit-wise(s)/phase-wise. Mandatory Spares - Within Ninety days (90) days from the date of BHEL clearance. Clearance may be issued by BHEL lot-wise/unit-wise(s)/phase-wise.
			PE-V0-XXX-508-E101	TDS FOR BATTERY	Primary		R-0 within 14 days from PO & subsequent revisions within 10 days of comments received from BHEL.	
			PE-V0-XXX-508-E103	BATTERY SIZING CALCULATION, FAULT CALCULATION AND CONNECTOR SIZING CALCULATION	Primary			
			PE-V0-XXX-508-E104	BILL OF MATERIAL FOR BATTERY	Primary			
			PE-V0-XXX-508-E108	LIST OF MANDATORY SPARES FOR BATTERY	Primary (for Mandatory Spares)	MS shall be Treated as Separate Item. Not to be Linked with Battery Manufacturing.		
			PE-V0-XXX-508-E902	QUALITY PLAN FOR BATTERY	Primary			
			PE-V0-XXX-508-E105	FIELD QUALITY PLAN PLAN FOR BATTERY	Secondary		R-0 within 30 days from PO & subsequent revisions within 10 days of comments received from BHEL.	
			PE-V0-XXX-508-E106	LIST OF E & C SPARES FOR BATTERY	Secondary			
			PE-V0-XXX-508-E107	LIST OF O&M SPARES FOR BATTERY	Secondary			
			PE-V0-XXX-508-E110	TYPE TEST REPORT FOR BATTERY	Secondary			
			PE-V0-XXX-508-E111	CABLE TERMINATION ARRANGEMENT FOR BATTERY TERMINAL	Secondary			
			PE-V0-XXX-508-E109	O & M MANUAL FOR BATTERY	Secondary		within 30 days of issuance of MDCC	

Notes :-

1. The end period specified is for completion of the deliveries. Deliveries to start progressively so as to meet the completion schedule.
2. The delivery conditions specified are for contractual LD purposes, however BHEL may ask for early deliveries without any compensation thereof.
3. Drawings /documents submission/re-submission schedule shall be as indicated in NIT which shall be used for progress monitoring purpose and required course correction, if any. Wherever schedule of drawings/documents stipulated in the Technical Specifications, same shall be superseded by delivery specified in NIT.

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4. **Delivery Extension:Extension of contractual delivery time**

Delivery time mentioned in the NIT includes Engineering completion time (time for drawing/document submission/resubmission by the vendor and review/approval of the same by the BHEL\End customer), manufacturing, i time. Due diligence is to be exhibited by the vendor to ensure timely completion of engineering and supply.

During the execution of the contract, time loss occurred owing to the reason attributable to BHEL besides force majeure shall be considered for delivery time extension to the vendor as given below:-

i.Delay in providing comments/ approval on Primary drawing/documents beyond 18 days or as specified in drawing/ documents submission/re-submission schedule enclosed with NIT for each iteration.

ii.Time Loss in approval of the drawing/document as a result of increase in the iteration not attributable to the vendor as certified by BHEL. Time extension equivalent to the resubmission time specified in the NIT and consequential increase in t time shall be applicable.

iii.Delay in providing engineering input/material by BHEL.

iv.Delay in deputing inspector for inspection and delay in release of MDCC in line with GCC/ GEM ATC terms.

v.Any hold put by BHEL for whatever reasons during execution of contract, time extension equivalent to hold period may be admissible.

Note: No delay analysis will be applicable if supply is completed within delivery schedule as specified in Purchase order.

5. **Validity of contract:**

5.a) Validity of the contract for main supply including subsequent lots, if applicable:

Contract shall be valid for 730 days from the PO date. However, delay at vendor's end (if any) shall be added to the validity period and contract validity shall get extended by the delay period at vendor's end.

For example: Delivery period: A (in days)

Delay at vendor's end: B (in days)

Contract validity: 730+B (in days)

Note: B is the Vendor delay days beyond contractual delivery period "A" / extended delivery period owing to time taken by BHEL at point no. 3 above.

5.b) Validity of the contract for supply of mandatory spares/ Electrolyte/BHMS/ services (other than PG test) applicable in the contract:

Validity of contract for supply of mandatory spares/ Electrolyte/BHMS/ services applicable in the contract shall be one year over and above contractual validity period for main supply.

5.c)Subsequent lots including quantity variation released within contractual validity period, to be supplied by vendor/supplier at PO rates, terms and condition.

5.d)Execution of the contract beyond contract validity period shall be decided on mutual consent basis.

ANNEXURE II TO RISK & COST

1. In case of delays (beyon d the maximu m late delive ry per iod as per LD cl ause) in supplie s, or if there be defective su pplies or no n-fulfilment o f any other terms and conditions of the Co ntract as en umerated subsequently in this clause, then, without prejudice to its right to recover any expenses, losses or damages to which the B uyer may b e put to in cur or sustain by rea son of th e Seller/ Contractor's d efault or b reach of Order/Contract or to suspend business dealings with the Seller/Contractor in terms of the Buyers' Guidelines for Suspension of Business Dealings as applicable from time to time, the Buyer shall also be entitled to cancel the Order/ Contract either in whol e or portion thereof without compensation to Seller. On t he occurrence of any of the acts/omission s mentioned below, the Buyer may if it so desi res, procure upon such terms and i n such manner as deemed appropriate, plant/equipment/ stores not so delivered or others of similar description where plant/ equipment/ stores exactly complying with particulars are not, in the opinion of the Buyer (wh ich shall be final), readily procurable, at the risk and cost of the Seller.

The Seller shall be liable to the Buyer for any excess co sts incurred thereof and the Seller shall continue the performance of the Order/Contract to the extent not cancelled under the provisions of this clause. The Seller shall on no account be entitled to any gain on such repurchases. If the Bidder doe s not agree to thi s Risk Purchase cl ause, BHEL reserves the right to reje ct the bid/offer of the Bidder. The ord er/contract may be cancelled in whole or p art thereof an d Risk & Co st Clause in lin e with term s and conditions of PO/Cont ract may be invoked by the Buyer in any of the following cases:

i. If the Seller/Contra ctor fails to deliver the good s or materials or any instalment thereof within the perio d(s) fixed for such delivery or the Seller's poor progress of the supply/services vis-à-vis delivery/execution timeline as stipulated in the contract, backlog attributable to the Seller including unexecuted portion of supply does not appear to be executable within balance period available;

ii. delivers g oods or mat erials not of the cont racted quality and failing to adhe re to the contra ct specifications/execution methodology;

iii. withdrawal from or repudiation/abandonment of the supply/services by the Seller before completion as per contract or if the Seller refuses or is unable to supply goods or materials covered by the order/Contract either in whole or in part or otherwise fails to perform the Order/Contract.

iv. Non supply by the Seller within scheduled completion/delivery period as per contract or as extended from time to time for reasons attributable to the Seller;

v. Termination of Contract on account of any other reason(s) attributable to the Seller.

vi. Assignment, transfer, sub-letting of Contract with out BHEL's written permission resulting in termination of Contract or part thereof by BHEL.

vii. If the Seller be an individual or a Sole Proprietorship, in the event of death or insanity of the Seller.

viii. If the Seller/Contractor being an individual or if a partnership firm thereof, shall at any time be a djudged insolvent or shall have a receivin g order for administration of his estate made against him or shall take a ny proceeding for composition under any Insolvency Act for the time being in force or make any assignment of the order/Contract or enter into any arrangement or composition with his credi tors or suspend payment or if the firm dissolved under the Partnership Act;

ix. If the Seller/Co ntractor being a Company is wo und up voluntarily or by order of a Cou rt or a Receiver, Liquidator or Manager on behalf of the debenture holders and creditors is appointed or circumstances have arisen which entitles the Court of debenture holder and creditors to appoint a receiver, liquidator or manager

x. Non- Compliance to any contractual condition or any other default attributable to the Seller.

Such defaulting vendor/Seller shall not be eligible to participate in re-tendering conducted on account of risk purchase made due to fault of such vendor/Seller.

2. BHEL's right to go for Risk and Cost, Calcul ation of Risk and Cost amount & L D, recovery options to BHEL are given as under: -

2.1 BHEL reserves the right to terminate the contra ct or withdraw portion of work and get it do ne through other agency, at the risk and cost of the contractor *after due notice of a period of 14 days' by BHEL* in any of the following cases:

i) If the Sell er/Contractor fails to deliver the go ods or materi als or any in stalment there of within th e period(s) fixe d for such d elivery or th e Seller' s poor p rogress of the su pply/ services v is-a-vis delivery/execution timelin e as stipulated in the Contract, backlog attributa ble to sell er i ncluding unexecuted portion of supply does not appear to be executable within balance available period;

ii) Delivers g oods o r mat erials not of the contra cted qu ality and failing to adhe re to t he contract specifications;

iii) Withdrawal from or repudiation/ abandonment of the supply/ services by Seller before completion as per contract or if the Seller refu ses or is unabl e t o supply go ods o r materials cove red by the Order/Contract either in whole or in part or otherwise fails to perform the Order/Contract;

iv) Non-supply by the Seller within scheduled completion/delivery period as per Contract or as extended from time to time, for the reasons attributable to the Seller;

v) Termination of Contract on account of any other reason (s) attributable to Seller.

vi) Assignment, transfer, subletting of Contract without BHEL's written permission resulting in termination of Contract or part thereof by BHEL.

vii) If the Seller be an individual or a sole proprietorship Firm, in the event of the death or insanity of the Seller;

viii) If the Seller/Contractor being an individual or if a firm on a partnership thereof, shall at any time, be adjudged insolvent or shall have a receiving order for administration of his estate made against him or shall take any proceeding for composition under any Insolvency Act for the time being in force or make any assignment of the Order/Contract or enter into any arrangement or composition with his creditors or suspend payment or if the firm dissolved under the Partnership Act;

ix) If the Seller/Contractor being a company is wound up voluntarily or by order of a Court or a Receiver, Liquidator or Manager on behalf of the debenture holders and creditors is appointed or circumstances shall have ari sen which entitles the Court of debenture holder and creditors to appoint a receiver, liquidator or manager;

x) Non-compliance to any contractual condition or any other default attributable to Seller.

2.1.1 <u>Risk & Cost Amount against Balance Work</u>:

Risk & Cost amount against balance work shall be calculated as follows:

Risk & Cost Amount= [(A-B) + (A x H/100)]

Where,
A= Value of Balance scope of Work (*) as per rates of new contract
B= Value of Balance scope of Work (*) as per rates of old contract being paid to the contractor at the time of termination of contract i.e. inclusive of PVC & ORC, if any.
H = Overhead Factor to be taken as 5

In case (A-B) is less than 0 (zero), value of (A-B) shall be taken as 0 (zero).

2.1.2 Balance scope of work (in case of termination of contract):

Difference of Contract Quantities and Executed Quantities as on the date of issue of Letter for 'Termination of Contract', shall be taken as balance scope of Work for calculating risk & cost amount.

Contract quantities are the quantities as per original contract. If, Contract has been amended, quantities as per amended Contract shall be considered as Contract Quantities.

Items for which total quantities to be executed have exceeded the Contract Quantities based on drawings issued to contractor from time to time till issue of Termination letter, then for these items total Quantities as per issued drawings would be deemed to be contract quantities.

Substitute/ extra items whose rates have already been approved would form part of contract quantities for this purpose.

Substitute/ extra items which have been executed but rates have not been approved, would also form part of contract quantities for this purpose and rates of such items shall be determined in line with contractual provisions.

However, increase in quantities on account of additional scope in new tender shall not be considered for this purpose.

NOTE: In case portion of work is being withdrawn at risk & cost of contractor instead of termination of contract, contract quantities pertaining to portion of work withdrawn shall be considered as 'Balance scope of work' for calculating Risk & Cost amount.

2.1.3 LD against delay in executed work in case of Termination of Contract:

LD against delay in executed work shall be calculated in line NIT terms & conditions, for the delay attributable to contractor. For limiting the maximum value of LD, contract value shall be taken as Executed Value of work till termination of contract.

Method for calculation of LD against delay in executed work in case of termination of contract" is given below:

i. Let the time period from scheduled date of start of work till termination of contract excluding the period of Hold (if any) not attributable to contractor = T1
ii. Let the value of executed work till the time of termination of contract = X
iii. Let the Total Executable Value of work for which inputs/fronts were made available to contractor and were planned for execution till termination of contract = Y
iv. Delay in executed work attributable to contractor i.e. T2 = [1-(X/Y)] x T1
v. LD shall be calculated in line with LD clause (clause 16) of the Contract for the delay attributable to contractor taking "X" as Contract Value and "T2" as period of delay attributable to contractor.

2.2 Recoveries arising out of Risk & Cost and LD or any other recoveries due from Contractor:

Without prejudice to the other means of recovery of such dues from the Seller recoveries from the Seller on whom risk
& cost has been invoked shall be made from the following:

a) Dues available in the form of Bills payable to seller, SD, BGs against the same contract.
b) Dues payable to seller against other contracts in the same Region/Unit/ Division of BHEL.
c) Dues payable to seller against other contracts in the different Region/Unit/ division of BHEL.

In-case recoveries are not possible with any of the above available options, Legal action shall be initiated for recovery against contractor.

CORPORATE QUALITY ASSURANCE/ कॉरपोरेट गुणवत्ता आश्वासन

SUB-VENDOR QUESTIONNAIRE/ सब-वेंडर प्रश्नावली

i.	*Item/Scope of Sub-contracting* उप-संविदा(अनुबंध) का मद/ दायरा			
ii.	*Address of the registered office* पंजीकृत कार्यालय का पता	*Details of Contact Person* संपर्क व्यक्ति का विवरण *(Name, Designation, Mobile, Email)* (नाम, पदनाम, मोबाइल, ईमेल)		
iii.	*Name and Address of the proposed Sub-vendor's works where item is being manufactured* प्रस्तावित उप-विक्रेता के कार्यों का नाम और पता, जहां मद का निर्माण किया जा रहा है	*Details of Contact Person:* संपर्क व्यक्ति का विवरण *(Name, Designation, Mobile, Email)* (नाम, पदनाम, मोबाइल, ईमेल)		
iv.	*Annual Production Capacity for proposed item/scope of sub-contracting* उप-संविदा(अनुबंध) के प्रस्तावित मद / दायरे के लिए वार्षिक उत्पादन क्षमता			
v.	*Annual production for last 3 years for proposed item/scope of sub-contracting* उप-संविदा(अनुबंध) के प्रस्तावित मद / दायरे के लिए पिछले 3 वर्षों का वार्षिक उत्पादन			
vi.	***Details of proposed works*** प्रस्तावित कार्यों का विवरण			
1.	*Year of establishment of present works* वर्तमान फैक्टरी की स्थापना का वर्ष			
2.	*Year of commencement of manufacturing at above works* उपरोक्त फैक्टरी में निर्माण कार्य शुरू होने का वर्ष			
3.	*Details of change in Works address in past (if any* पूर्व में फैक्टरी स्थल में परिवर्तन का विवरण (यदि कोई हो))			
4.	*Total Area* कुल क्षेत्र			
	Covered Area शामिल क्षेत्र			
5.	*Factory Registration Certificate* फैक्टरी पंजीकरण प्रमाण पत्र	*Details attached at Annexure – F2.1* विवरण अनुलग्नक- एफ 2.1 पर संलग्न है		
6.	*Design/ Research & development set-up* डिजाइन / अनुसंधान और विकास सेटअप *(No. of manpower, their qualification, machines & tools employed etc.)* (श्रमिकों की संख्या, उनकी योग्यता, मशीन और उपलब्ध उपकरण आदि)	*Applicable / Not applicable if manufacturing is as per Main Contractor/purchaser design)* *Details attached at Annexure – F2.2* *(if applicable)* लागू / लागू नहीं, अगर विनिर्माण मुख्य संविदाकार / खरीददार के डिजाइन के अनुसार है) विवरण अनुलग्नक –एफ 2.2 पर संलग्न है। (यदि लागू हो)		
7.	*Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc)* मैनपावर विवरण के साथ समग्र संगठन का चार्ट(डिजाइन / विनिर्माण / गुणवत्ता आदि)	*Details attached at Annexure – F2.3* विवरण अनुलग्नक – F2.3 में संलग्न है।		

8.	*After sales service set up in India, in case of foreign sub-vendor(Location, Contact Person, Contact details etc.)* भारत में विक्री सेवा की स्थापना के वाद, विदेशी उप-विक्रेता के मामले में(स्थल , संपर्क व्यक्ति, संपर्क विवरण आदि)	*Applicable / Not applicable* लागू / लागू नहीं *Details attached at Annexure – F2.4* विवरण अनुलग्नक -2.4 पर संलग्न है ।
9.	*Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any* फ्लोचार्ट सहित विनिर्माण प्रक्रिया निष्पादन योजना , जिसमें आउटसोर्स प्रक्रिया, यदि कोई हो, सहित कच्चे माल से तैयार उत्पाद तक विनिर्माण के विभिन्न चरणों को दर्शाया गया हो,	*Details attached at Annexure – F2.5* विवरण अनुलग्नक - F2.5में संलग्न है ।
10.	*Sources of Raw Material/Major Bought Out Item* कच्चे माल के स्रोत / खरीदे हुए मुख्य मद	*Details attached at Annexure – F2.6* विवरण अनुलग्नक - F2.6में संलग्न है।
11.	*Quality Control exercised during receipt of raw material/BOI, in-process , Final Testing, packing* कच्चे माल / खरीदे हुए मद, प्रक्रियाबद्ध, अंतिम परीक्षण, पैकिंग करते समय गुणवत्ता नियंत्रण	*Details attached at Annexure – F2.7* विवरण अनुलग्नक - F2.7 पर संलग्न है
12.	*Manufacturing facilities (List of machines, special process facilities, material handling etc.)* विनिर्माण सुविधा(मशीनों की सूची , विशेष प्रक्रिया सुविधाएं, सामग्री रख-रखाव आदि)	*Details attached at Annexure – F2.8* विवरण अनुलग्नक - F2.8में संलग्न है ।
13.	*Testing facilities (List of testing equipment)* परीक्षण सुविधाएं(परीक्षण उपकरण की सूची)	*Details attached at Annexure – F2.9* विवरण अनुलग्नक – F2. 9 में संलग्न है ।
14.	*If manufacturing process involves fabrication then-* यदि निर्माण प्रक्रिया में फेब्रिकेशन की गई है तो- *List of qualified Welders* पात्र वेल्डर की सूची *List of qualified NDT personnel with area of specialization* विशेषज्ञता के क्षेत्र सहित पात्र एनडीटी कार्मिकों की सूची	*Applicable / Not applicable* लागू / लागू नहीं *Details attached at Annexure – F2.10* विवरण अनुलग्नक - F2.10में संलग्न है। *(If applicable)* लागू / लागू नहीं
15.	*List of out-sourced manufacturing processes with Sub-Vendors' names & addresses* सब-वेंडर द्वारा बाह्य स्रोतों (उनके नाम और पते सहित)से करवाएं गए निर्माण प्रक्रियाओं की सूची	*Applicable / Not applicable* लागू / लागू नहीं *Details attached at Annexure. –F2.11* विवरण अनुलग्नक - F2.10में संलग्न है। *(If applicable)* (यदि लागू हो)
16.	*Supply reference list including recent supplies* नवीनतम आपूर्ति सहित आपूर्ति संदर्भ सूची	*Details attached at Annexure – F2.12* विवरण अनुलग्नक - F2.12 में संलग्न है । *(as per format given below)* (नीचे दिए गए प्रारूप के अनुसार)

Project/ package परियोजना /पैकेज	*Customer Name* ग्राहक का नाम	*Supplied Item (Type/Rating/Model /Capacity/Size etc)* आपूर्ति की गई वस्तु (प्रकार / रेटिंग / मॉडल / क्षमता / आकार आदि)	*PO ref no/date* पीओ संदर्भ सं. / तिथि	*Supplied Quantity* आपूर्ति की मात्रा	*Date of Supply* आपूर्ति की तारीख

17.	*Product satisfactory performance feedback letter/certificates/End User Feedback* उत्पाद के संतोषजनक प्रदर्शन संबंधी फीडबैक पत्र / प्रमाण पत्र / अंतिम उपयोगकर्ता फ़ीडबैक	*Attached at annexure - F2.13* अनुलग्नक F2. 3पर संलग्न है

18.	***Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product (similar or higher rating)*** प्रस्तावित उत्पाद (एक समान या उच्च रेटिंग वाले) के लिए टाइप टेस्ट रिपोर्ट (टाइप टेस्ट विवरण, रिपोर्ट संख्या, एजेंसी, जांच की तारीख) का सारांश नोट: - रिपोर्ट प्रस्तुत करने की आवश्यकता नहीं है ***Note:- Reports need not to be submitted***	***Applicable / Not applicable*** लागू / लागू नहीं ***Details attached at Annexure – F2.14*** विवरण अनुलग्नक - F2.1 4में संलग्न है ***(if applicable)*** (यदि लागू हो)
19.	***Statutory / mandatory certification for the proposed product*** प्रस्तावित उत्पाद के लिए वैधानिक / अनिवार्य प्रमाणीकरण	***Applicable / Not applicable*** लागू / लागू नहीं ***Details attached at Annexure – F2.15*** ***(if applicable)*** (यदि लागू हो)
20.	***Copy of ISO 9001 certificate*** आईएसओ 9001 प्रमाण पत्र की प्रति ***(If available***(यदि उपलब्ध हो)	***Attached at Annexure – F2.16*** अनुलग्नक में संलग्न - F2.1 6 है
21.	***Product technical catalogues for proposed item (if available)*** प्रस्तावित मद के लिए उत्पाद तकनीकी कैटलॉग (यदि उपलब्ध हो)	***Details attached at Annexure – F2.17*** विवरण अनुलग्नक - F2.1 7 में संलग्न है

Name: *नाम:*		***Desig:*** *पद:*		***Sign:*** *हस्ताक्षर:*		***Date:*** *तिथि:*	

Company's Seal/Stamp:- *कंपनी की मुहर / मोहर: -*