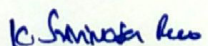
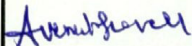


TD- Rev No. 00	Form No. 	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		PY 55027 Rev No.00 PAGE 1 of 17	
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		<u>TECHNICAL SPECIFICATION</u> <u>FOR</u> <u>STATIONARY LEAD-ACID STATIONARY(PLANTE) BATTERIES</u>			
		Ref. Doc	Revisions Refer to record of Revisions:	Prepared:  (K SRINIVASA RAO)	Checked:  (A V SURESH)

TD- Rev No. 00	Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	PY 55027																												
				Rev No.00																												
				PAGE 2 of 17																												
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		<table border="1"> <thead> <tr> <th><u>Sl.No.</u></th> <th><u>CONTENTS</u></th> </tr> </thead> <tbody> <tr> <td>1.0</td> <td>SCOPE</td> </tr> <tr> <td>2.0</td> <td>CODES & STANDARDS</td> </tr> <tr> <td>3.0</td> <td>GENERAL REQUIREMENTS</td> </tr> <tr> <td>4.0</td> <td>SITE CONDITIONS</td> </tr> <tr> <td>5.0</td> <td>TECHNICAL REQUIREMENTS & ACCESSORIES</td> </tr> <tr> <td>6.0</td> <td>SPARES</td> </tr> <tr> <td>7.0</td> <td>TOOLS AND TACKLES</td> </tr> <tr> <td>8.0</td> <td>PERFORMANCE GUARANTEE</td> </tr> <tr> <td>9.0</td> <td>TESTING REQUIREMENTS</td> </tr> <tr> <td>10.0</td> <td>PACKING AND DESPATCH</td> </tr> <tr> <td>11.0</td> <td>MATERIAL CODES (For BHEL internal use)</td> </tr> <tr> <td>12.0</td> <td>DATASHEET (To be filled by Manufacturer)</td> </tr> <tr> <td>13.0</td> <td>RECORD OF REVISIONS</td> </tr> </tbody> </table>			<u>Sl.No.</u>	<u>CONTENTS</u>	1.0	SCOPE	2.0	CODES & STANDARDS	3.0	GENERAL REQUIREMENTS	4.0	SITE CONDITIONS	5.0	TECHNICAL REQUIREMENTS & ACCESSORIES	6.0	SPARES	7.0	TOOLS AND TACKLES	8.0	PERFORMANCE GUARANTEE	9.0	TESTING REQUIREMENTS	10.0	PACKING AND DESPATCH	11.0	MATERIAL CODES (For BHEL internal use)	12.0	DATASHEET (To be filled by Manufacturer)	13.0	RECORD OF REVISIONS
<u>Sl.No.</u>	<u>CONTENTS</u>																															
1.0	SCOPE																															
2.0	CODES & STANDARDS																															
3.0	GENERAL REQUIREMENTS																															
4.0	SITE CONDITIONS																															
5.0	TECHNICAL REQUIREMENTS & ACCESSORIES																															
6.0	SPARES																															
7.0	TOOLS AND TACKLES																															
8.0	PERFORMANCE GUARANTEE																															
9.0	TESTING REQUIREMENTS																															
10.0	PACKING AND DESPATCH																															
11.0	MATERIAL CODES (For BHEL internal use)																															
12.0	DATASHEET (To be filled by Manufacturer)																															
13.0	RECORD OF REVISIONS																															
Ref. Doc																																

TD- Rev No. 00	Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		PY 55027																																																
					Rev No.00																																																
					PAGE 3 of 17																																																
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company. 1.0 <u>SCOPE</u> 1.1 This specification covers the requirements of design, materials, constructional features, manufacture, assembly, testing, packing and dispatch of vented type lead acid batteries complete with all accessories & commissioning spares (as required) for stationary float applications. 1.2 Scope of supply shall include the following:- a) Design, Manufacture, Assembly, Testing, Packing and Delivery of batteries with accessories including battery racks and necessary tools & tackles to site. b) Supply of Commissioning spares as required for successful commissioning of batteries at site. 1.3 Scope of services shall include the following:- a) Supervision of Erection, Testing and Commissioning at site. 2.0 <u>CODES AND STANDARDS</u> 2.1 The equipment shall comply with the requirements of latest revision of following applicable standards. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Sl. No.</th> <th style="text-align: center;">International standards</th> <th style="text-align: center;">National standards</th> <th style="text-align: center;">Description</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td>BS 6290-2:1999</td> <td>IS-1652</td> <td>Specification for Stationary cells and batteries- Lead acid type (With Plante Positive Plates)</td> </tr> <tr> <td style="text-align: center;">2.</td> <td>IEC-60896 (Part-11)</td> <td>IS-8320 : 2000</td> <td>Stationary lead-acid batteries - Part 11: Vented types - General requirements and methods of tests</td> </tr> <tr> <td style="text-align: center;">3.</td> <td>IEC</td> <td>IS-3116 : 1965</td> <td>Specification for Sealing compound for lead-acid batteries</td> </tr> <tr> <td style="text-align: center;">4.</td> <td>IEC</td> <td>IS-6071 : 1986</td> <td>Specification for Synthetic separators for lead-acid batteries (first revision)</td> </tr> <tr> <td style="text-align: center;">5.</td> <td>IEC</td> <td>IS-1069 (1993)</td> <td>Specification for water for storage batteries</td> </tr> <tr> <td style="text-align: center;">6.</td> <td>IEC/DIN</td> <td>IS-266 : 1977</td> <td>Specification for Sulphuric acid</td> </tr> <tr> <td style="text-align: center;">7.</td> <td>IEC</td> <td>IS: 1146 (1993)</td> <td>Specification for rubber and plastic containers for lead acid batteries</td> </tr> <tr> <td style="text-align: center;">8.</td> <td>IEC-60051 (all parts)</td> <td>IS-1248 (Part 2) : 2003</td> <td>Direct acting indicating analogue electrical measuring instruments and their accessories</td> </tr> <tr> <td style="text-align: center;">9.</td> <td>IEC-60485</td> <td></td> <td>Digital electronic d.c. voltmeters and d.c. electronic analogue-to-digital converters</td> </tr> <tr> <td style="text-align: center;">10.</td> <td>IEC-60410</td> <td></td> <td>Sampling plans and procedures for inspection by attributes</td> </tr> <tr> <td style="text-align: center;">11.</td> <td>ASTM D-2863</td> <td></td> <td>Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like</td> </tr> </tbody> </table>						Sl. No.	International standards	National standards	Description	1.	BS 6290-2:1999	IS-1652	Specification for Stationary cells and batteries- Lead acid type (With Plante Positive Plates)	2.	IEC-60896 (Part-11)	IS-8320 : 2000	Stationary lead-acid batteries - Part 11: Vented types - General requirements and methods of tests	3.	IEC	IS-3116 : 1965	Specification for Sealing compound for lead-acid batteries	4.	IEC	IS-6071 : 1986	Specification for Synthetic separators for lead-acid batteries (first revision)	5.	IEC	IS-1069 (1993)	Specification for water for storage batteries	6.	IEC/DIN	IS-266 : 1977	Specification for Sulphuric acid	7.	IEC	IS: 1146 (1993)	Specification for rubber and plastic containers for lead acid batteries	8.	IEC-60051 (all parts)	IS-1248 (Part 2) : 2003	Direct acting indicating analogue electrical measuring instruments and their accessories	9.	IEC-60485		Digital electronic d.c. voltmeters and d.c. electronic analogue-to-digital converters	10.	IEC-60410		Sampling plans and procedures for inspection by attributes	11.	ASTM D-2863		Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like
						Sl. No.	International standards	National standards	Description																																												
						1.	BS 6290-2:1999	IS-1652	Specification for Stationary cells and batteries- Lead acid type (With Plante Positive Plates)																																												
						2.	IEC-60896 (Part-11)	IS-8320 : 2000	Stationary lead-acid batteries - Part 11: Vented types - General requirements and methods of tests																																												
						3.	IEC	IS-3116 : 1965	Specification for Sealing compound for lead-acid batteries																																												
						4.	IEC	IS-6071 : 1986	Specification for Synthetic separators for lead-acid batteries (first revision)																																												
						5.	IEC	IS-1069 (1993)	Specification for water for storage batteries																																												
						6.	IEC/DIN	IS-266 : 1977	Specification for Sulphuric acid																																												
						7.	IEC	IS: 1146 (1993)	Specification for rubber and plastic containers for lead acid batteries																																												
						8.	IEC-60051 (all parts)	IS-1248 (Part 2) : 2003	Direct acting indicating analogue electrical measuring instruments and their accessories																																												
						9.	IEC-60485		Digital electronic d.c. voltmeters and d.c. electronic analogue-to-digital converters																																												
10.	IEC-60410		Sampling plans and procedures for inspection by attributes																																																		
11.	ASTM D-2863		Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like																																																		
Ref. Doc																																																					

TD- Rev No. 00	Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		PY 55027																								
					Rev No.00																								
					PAGE 4 of 17																								
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company. <table border="1" style="width: 100%;"> <tr> <td style="width: 5%;"></td> <td style="width: 20%;"></td> <td style="width: 20%;"></td> <td style="width: 55%;">Combustion of Plastics (Oxygen Index).</td> </tr> <tr> <td>12.</td> <td>IEEE: 485</td> <td></td> <td>Recommended practice for sizing large lead acid storage batteries for generating stations and substations.</td> </tr> <tr> <td>13.</td> <td>IEEE-484</td> <td></td> <td>Recommended practice for design and installation of Storage batteries.</td> </tr> </table> 2.2 In case Indian Standards are not available for any equipment to be installed indigenously, the standards issued by IEC/BS/VDE/IEEE/NEMA or equivalent agency shall be applicable. 2.3 Manufacturer to note that wherever IS is mentioned equivalent IEC is also acceptable. In case of any technical requirement not covered by IEC, technical requirement as per IS shall prevail. 2.4 The equipment installed in India shall confirm to the provisions of Indian Electricity Rules and other statutory regulations currently in force in the country. In case the equipment is installed abroad, the statutory regulations of the respective country shall be followed. 2.5 In case of imported equipment, standards of the country of origin shall be applicable if these standards are equivalent or more stringent than the applicable IEC/BS/VDE/IEEE/NEMA standards. 3.0 <u>GENERAL REQUIREMENTS</u> 3.1 The offered equipment shall be brand new with state of the art technology and proven field track record. No prototype equipment shall be offered. 3.2 Manufacturer shall ensure availability of spare parts and maintenance support for the offered equipment for at least 10 years from the date of supply. However before phasing out the product/ spares, manufacturer shall give a notice of at least one year to the end user so as to enable the end user to place order for spares and services. 4.0 <u>SITE CONDITIONS</u> 4.1 Stationary Lead acid batteries shall be suitable for operating satisfactorily in humid and corrosive environment found in refineries, petrochemical and gas processing plants and other industrial plants. Service conditions shall be as specified project specific data (i.e. ANNEXURE-A). If not specifically mentioned therein, design ambient temperature of 40°C and altitude not exceeding 1000m above MSL shall be considered. 5.0 <u>TECHNICAL REQUIREMENTS</u> <table border="1" style="width: 100%;"> <thead> <tr> <th style="width: 10%;">Sl.No</th> <th style="width: 40%;">Description</th> <th style="width: 50%;">Requirements</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Battery general requirements</td> <td></td> </tr> <tr> <td>a)</td> <td>Vented type stationary Lead acid Battery with Plante positive plates</td> <td></td> </tr> <tr> <td>b)</td> <td>Design Criteria</td> <td>1. The batteries shall meet the duty cycle requirements under all site and operating conditions as specified in Annexure-A</td> </tr> </tbody> </table>									Combustion of Plastics (Oxygen Index).	12.	IEEE: 485		Recommended practice for sizing large lead acid storage batteries for generating stations and substations.	13.	IEEE-484		Recommended practice for design and installation of Storage batteries.	Sl.No	Description	Requirements	1.	Battery general requirements		a)	Vented type stationary Lead acid Battery with Plante positive plates		b)	Design Criteria	1. The batteries shall meet the duty cycle requirements under all site and operating conditions as specified in Annexure-A
									Combustion of Plastics (Oxygen Index).																				
12.	IEEE: 485		Recommended practice for sizing large lead acid storage batteries for generating stations and substations.																										
13.	IEEE-484		Recommended practice for design and installation of Storage batteries.																										
Sl.No	Description	Requirements																											
1.	Battery general requirements																												
a)	Vented type stationary Lead acid Battery with Plante positive plates																												
b)	Design Criteria	1. The batteries shall meet the duty cycle requirements under all site and operating conditions as specified in Annexure-A																											
Ref. Doc																													

TD- Rev No. 00	Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		PY 55027																																										
					Rev No.00																																										
					PAGE 5 of 17																																										
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.			<table border="1"> <tr> <td></td> <td></td> <td>2. The sizing of batteries shall be strictly as per IEEE guidelines. Any deviation in this regard is not acceptable.</td> </tr> <tr> <td>c)</td> <td>Discharge performance</td> <td>NDP/HDP as specified in Annexure-A</td> </tr> <tr> <td>d)</td> <td>Proposed Method of working :</td> <td></td> </tr> <tr> <td>i.</td> <td>Single Cell Nominal Voltage</td> <td>2 V</td> </tr> <tr> <td>ii.</td> <td>Float charging Voltage</td> <td>Voltage Range: 2.15 - 2.25 V/cell</td> </tr> <tr> <td>iii.</td> <td>Boost charging Voltage</td> <td>Based on IU characteristics</td> </tr> <tr> <td>e)</td> <td>Nominal System voltage</td> <td>As specified in Annexure-A</td> </tr> <tr> <td>f)</td> <td>No.of cells/set of battery bank</td> <td>55 cells for 110V and 110 cells for 220V unless otherwise specified in Annexure-A</td> </tr> <tr> <td>g)</td> <td>Requirement of Tap Cell</td> <td>Yes. At 80% of Total No. of cells.</td> </tr> <tr> <td>h)</td> <td>Application</td> <td> - Battery shall be suitable for long life under continuous float condition. (Permanently connected in parallel with charger and load). - On loss of main supply, Battery is intended to feed Reliable D.C. power to essential emergency loads such as DC Motors, Protection Relays, Breaker controls, indication, DC critical lighting and annunciation of power plant equipment unless otherwise specified in Annexure-A. </td> </tr> <tr> <td>i)</td> <td>Delivery condition to site:</td> <td>Dry Uncharged State.</td> </tr> <tr> <td>j)</td> <td>Time duration to put the battery in fully charged condition from fully discharged state</td> <td>10-12 hours after a duty cycle discharge under constant current mode.</td> </tr> <tr> <td>k)</td> <td>Information to be permanently marked on each cell as per standards.</td> <td> - Nominal voltage. - Name of manufacturer/model reference. - Rated capacity in ampere hours (Ah) with end cell voltage. - Voltage for float operation of 27°C with tolerance of ± 1% - Month and year of manufacture. - Cell Number. - Type of Positive plate. - Type of Container. - Polarity marking. - Country of origin - Upper and lower electrolyte levels in case of Transparent containers. </td> </tr> <tr> <td>l)</td> <td>Information shall be given on the instruction cards</td> <td> - Manufacturer's instructions for filling and initial charging of the battery together </td> </tr> </table>					2. The sizing of batteries shall be strictly as per IEEE guidelines. Any deviation in this regard is not acceptable.	c)	Discharge performance	NDP/HDP as specified in Annexure-A	d)	Proposed Method of working :		i.	Single Cell Nominal Voltage	2 V	ii.	Float charging Voltage	Voltage Range: 2.15 - 2.25 V/cell	iii.	Boost charging Voltage	Based on IU characteristics	e)	Nominal System voltage	As specified in Annexure-A	f)	No.of cells/set of battery bank	55 cells for 110V and 110 cells for 220V unless otherwise specified in Annexure-A	g)	Requirement of Tap Cell	Yes. At 80% of Total No. of cells.	h)	Application	- Battery shall be suitable for long life under continuous float condition. (Permanently connected in parallel with charger and load). - On loss of main supply, Battery is intended to feed Reliable D.C. power to essential emergency loads such as DC Motors, Protection Relays, Breaker controls, indication, DC critical lighting and annunciation of power plant equipment unless otherwise specified in Annexure-A.	i)	Delivery condition to site:	Dry Uncharged State.	j)	Time duration to put the battery in fully charged condition from fully discharged state	10-12 hours after a duty cycle discharge under constant current mode.	k)	Information to be permanently marked on each cell as per standards.	- Nominal voltage. - Name of manufacturer/model reference. - Rated capacity in ampere hours (Ah) with end cell voltage. - Voltage for float operation of 27°C with tolerance of ± 1% - Month and year of manufacture. - Cell Number. - Type of Positive plate. - Type of Container. - Polarity marking. - Country of origin - Upper and lower electrolyte levels in case of Transparent containers.	l)	Information shall be given on the instruction cards	Manufacturer's instructions for filling and initial charging of the battery together
					2. The sizing of batteries shall be strictly as per IEEE guidelines. Any deviation in this regard is not acceptable.																																										
			c)	Discharge performance	NDP/HDP as specified in Annexure-A																																										
			d)	Proposed Method of working :																																											
			i.	Single Cell Nominal Voltage	2 V																																										
			ii.	Float charging Voltage	Voltage Range: 2.15 - 2.25 V/cell																																										
			iii.	Boost charging Voltage	Based on IU characteristics																																										
			e)	Nominal System voltage	As specified in Annexure-A																																										
			f)	No.of cells/set of battery bank	55 cells for 110V and 110 cells for 220V unless otherwise specified in Annexure-A																																										
			g)	Requirement of Tap Cell	Yes. At 80% of Total No. of cells.																																										
			h)	Application	- Battery shall be suitable for long life under continuous float condition. (Permanently connected in parallel with charger and load). - On loss of main supply, Battery is intended to feed Reliable D.C. power to essential emergency loads such as DC Motors, Protection Relays, Breaker controls, indication, DC critical lighting and annunciation of power plant equipment unless otherwise specified in Annexure-A.																																										
			i)	Delivery condition to site:	Dry Uncharged State.																																										
			j)	Time duration to put the battery in fully charged condition from fully discharged state	10-12 hours after a duty cycle discharge under constant current mode.																																										
			k)	Information to be permanently marked on each cell as per standards.	- Nominal voltage. - Name of manufacturer/model reference. - Rated capacity in ampere hours (Ah) with end cell voltage. - Voltage for float operation of 27°C with tolerance of ± 1% - Month and year of manufacture. - Cell Number. - Type of Positive plate. - Type of Container. - Polarity marking. - Country of origin - Upper and lower electrolyte levels in case of Transparent containers.																																										
			l)	Information shall be given on the instruction cards	Manufacturer's instructions for filling and initial charging of the battery together																																										
Ref. Doc																																															

TD- Rev No. 00	Form No.	बी एच ई एल  HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		PY 55027
					Rev No.00
					PAGE 7 of 17
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.	Ref. Doc			lead-coated. The material for bolts and nuts shall be brass/ mild steel. Bolts and nuts, for connecting the cells, shall be effectively lead-coated to prevent corrosion from Sulphuric acid. The fasteners when used in bolt-on type terminal shall preferably have a plastic head for insulation purpose with an access point to enable voltage measurement. • All Terminals and cells inter-connectors shall be fully insulated with insulated covers/shrouds. • All live surfaces of battery shall be shrouded and connectors insulated. Only copper cables and lugs shall be used on battery terminals.	
		d)	Type of inter cell/inter row/interbank connectors	• PVC insulated lead plated Copper (or better product) shall be provided for Inter-cell connectors. • Flexible PVC insulated lead plated Copper (or better product) cables shall be provided for Inter-row and interbank connectors. • All the terminals and inter-cell connectors shall be fully insulated or shrouded. • All inter-row, inter-cell connectors shall confirm to safety requirements of ANSI/UL94.	
		6.	Venting device		
		a)	Purpose:	To prevent Explosion by allowing the vented gases to outside environment & Electrolyte contamination, spilling.	
		b)	Type	Anti-splash flame arresting type with splash guard and flame arresting vent plug with vent holes.	
		c)	Design requirement	• Water loss due to evaporation to be kept minimum. • Flexibility in removing the device for topping up the cells. Suitable dimensions to insert comfortably syringe type hydrometer into the vent to take electrolyte sample. • Vent plug with more than one exit hole to allow the gases to escape freely but prevent acid from coming out.	
		7.	Cell Containers and Cell lids		
		a)	Material:	Acid resistant transparent/translucent material and designed to withstand mechanical stresses, shocks and vibrations.	
		b)	Container type	Transparent halogen-free SAN container as specified in Annexure-A .	
		c)	Properties	• Container shall be restricted breathing type and house positive and negative plates, separators,	

TD- Rev No. 00	Form No.	बी एच ई एल  HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		PY 55027
					Rev No.00
					PAGE 8 of 17
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.				receptacles, hold-down bar, vent tubes, name plates and vent plugs. • The containers shall be strong enough, so that excessive bulging of container does not occur during service. • Container and Lid should be welded and should not cause leakage of electrolyte/gases during operation even in case of normal mechanical/electrical abuses. • Containers, lids, covers and seals used in manufacture shall meet the Fire, flame and smoking resistance rating as defined in ANSI/UL94 and have an oxygen Index of at least 28 in accordance with ASTM D-2863. • Each cell shall have a separate container and construction of cells shall ensure proper air circulation between the cells for heat dissipation/ventilation.	
	8.	Cable Take-Offs.			
	a)	Cable interconnection with charger	• 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. • The cable connecting Tap cell and end terminal plate is in Bidder's scope of supply. • Size of terminal plate shall be suitable for the cable size to be furnished during detail engineering.		
	b)	Cable accessories for termination at battery end	Lead-coated bent copper plate (or a better product), teak wood clamp (or a better product), bolts, nuts; washers, etc. shall be furnished for connection of outgoing stranded copper cables from battery to charger.		
	9.	Battery Stand (Requirement of Battery Stand shall be referred to Annexure-A)			
	a)	Material	Mild steel corrosion resistant/ teak wood stand of reputed make as specified in Annexure-A .		
	b)	Rack Construction	• Steel frames forming a rigid structure. • Free standing type mounted on porcelain/ hard rubber/ PVC pads insulators. • Pretreatment & three (3) coats of anti-alkali (epoxy) paint of approved shade for the batteries racks and supports. • High impact plastic rack/stand insulators shall be provided (5% extra than required). • Each cell shall be separately supported on		
	Ref. Doc				

TD- Rev No. 00	Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		PY 55027
					Rev No.00
					PAGE 9 of 17

COPYRIGHT AND CONFIDENTIAL

The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.

		PVC/porcelain/hard rubber insulators fixed on the racks with adequate clearance between adjacent cells. Minimum distance between the adjacent cells shall be more than the bulge allowed for two cells in accordance with IS 1146/IEC.
c)	Name plate	- Cell Numbering stickers/plates, resistant to acid, shall be attached to each cell. - Wherever racks are transported in dismantled conditions, match markings shall be provided to facilitate easy assembly. - Acid resistant Name plates with Tag Nos. for each battery bank (Tag Nos. shall be furnished during detail engineering) shall be provided.
d)	Rack Arrangement	- Arrangement shall be as per manufacturer recommendation. - If the site location falls under Seismic Zone, Batteries along with rack shall be designed & tested for seismic requirement. Accordingly, relevant type test certificates shall be furnished for customer approval.
e)	Layout	- Layout drawing indicating dimension of each cell, overall dimensions of Battery banks, total weight of the battery banks with cells etc., shall be submitted separately for approval. - While proposing the battery room layout, Bidder shall consider sufficient clear space for attending individual cells for inspection, topping up etc.
f)	Ground clearance from the bottom tier of stand.	150mm minimum above the floor.

5.1 ACCESSORIES

Each set of battery shall be supplied with all accessories, including, but not limited to following for facilitating installation, testing and maintenance activities. However, refer **Annexure-A** for any additions/extra requirement/modification in the BOQ.

Sl.No	Description	Quantity
1.	Battery Stand	1 Set
2.	Electrolyte (As required for first filling with 10% extra to be supplied in non-returnable containers)	1 Set
3.	Intercell connectors (As required for complete battery)	1 Set
4.	Inter row connectors (As required for complete battery)	1 Set

TD- Rev No. 00	Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		PY 55027										
					Rev No.00										
					PAGE 10 of 17										
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.															
						5.	Interbank connectors and end takeoffs (As required for complete battery)	1 Set							
						6.	Stand & cell Insulators (Polypropylene/PVC channel for Mild steel stand, Porcelain for teak wood stand) (As required for complete battery with 5% extra)	1 Set							
						7.	Vent caps (As required for complete battery with 5% extra)	1 Set							
						8.	Bolts, nuts & Washers (As required for complete installation with 3% extra)	1 Set							
						9.	Corrosion preventive Petroleum jelly (As required for complete installation)	1 Set							
						10.	Following accessories for testing and maintenance								
						a)	Digital Cell testing DC Voltmeter (Range: Suitable leads shall be provided for measuring cell voltage (-3, 0, +3 volts))	2 Nos.							
						b)	Hydrometer (Type: Syringe type Hydrometers for measuring specific gravity of electrolyte suitable for the vent holes in different cells in steps of 0.002)	3 Nos.							
						c)	Thermometer (For measuring electrolyte temperature with specific gravity correction scale.)	3 Nos.							
						d)	Rubber siphon (2" dia, 2mts long.)	1 No.							
						e)	Acid resisting funnels	2 Nos.							
						f)	Acid resisting jugs (each of 2 liters)	2 Nos.							
						g)	Rubber Aprons	2 Nos.							
						h)	Rubber hand gloves	4 pairs							
						i)	Rubber shoes	1 pair							
						j)	Set of insulated Spanners	2 Nos.							
						k)	"NO SMOKING" notice board	2 Nos.							
						l)	Industrial Goggles	2 Nos.							
						m)	Instruction card	5 Nos.							
						n)	Cell lifting facility (cell lifting straps)	1 Nos.							
						o)	Specific Gravity correction chart	2 Nos.							
						p)	Wall mounting type holder for hydrometer /thermometer	3 Nos.							
						q)	Minimum and maximum temperature indicator for each battery room	1 No.							
						r)	Battery maintenance record book	5 Nos.							
						s)	Rubber syringe	1 No.							
						6.0 SPARES									
						<table border="1"> <tr> <th>Sl.No</th> <th>Description</th> </tr> <tr> <td>6.1</td> <td> Commissioning spares The spares which would be required during plant or equipment testing, start-up and commissioning. These spares have to be supplied along with the main equipment. The list of commissioning spares shall include minimum of following. </td> </tr> </table>						Sl.No	Description	6.1	Commissioning spares The spares which would be required during plant or equipment testing, start-up and commissioning. These spares have to be supplied along with the main equipment. The list of commissioning spares shall include minimum of following.
						Sl.No	Description								
						6.1	Commissioning spares The spares which would be required during plant or equipment testing, start-up and commissioning. These spares have to be supplied along with the main equipment. The list of commissioning spares shall include minimum of following.								
Ref. Doc															

TD- Rev No. 00	Form No.	बी एच ई एल  HYDERABAD	PRODUCT STANDARD		PY 55027				
			PROJECT ENGINEERING & SYSTEMS DIVISION		Rev No.00				
			HYDERABAD		PAGE 11 of 17				
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.							○ Intercell connectors – 5% of total quantity supplied. ○ Inter row connectors – 5% of total quantity supplied. ○ Terminal plate (i.e End connector plate) – 1 no. ○ Nuts/bolts & washers – 10 sets (Each set consists of one bolt, one nut & suitable washer)		
						6.2	<u>Recommended spares</u> • These spares would be required during the two (2) years of the normal and trouble-free plant operation. Manufacturer to provide the recommended list of the O&M spares. • BHEL will place order as per the requirement from end user. The price offered for these spares shall be valid for 2 years.		
						6.3	<u>Mandatory Spares</u> • As per Annexure-A if applicable		
						7.0 <u>TOOLS AND TACKLES</u>			
7.1 Tools & tackle which are essential to facilitate assembly, adjustments, maintenance & dismantling of equipment shall be provided as part of equipment supplied. The above tools shall be supplied along with the initial consignment of equipment so as to be available prior to erection but may not be used for erection purposes.									
8.0 <u>PERFORMANCE GUARANTEE</u>									
<table><tr><td>Sl.No</td><td>Description</td></tr><tr><td>8.1</td><td>Manufacturers shall guarantee that Battery shall meet the specified duty cycle requirements at the specified minimum electrolytic temperature as stipulated in this specification and as confirmed by them in technical data sheets. In case, the performance of battery at site is not as per the performance guarantee, the manufacturer should replace the Battery at site free of cost.</td></tr></table>						Sl.No	Description	8.1	Manufacturers shall guarantee that Battery shall meet the specified duty cycle requirements at the specified minimum electrolytic temperature as stipulated in this specification and as confirmed by them in technical data sheets. In case, the performance of battery at site is not as per the performance guarantee, the manufacturer should replace the Battery at site free of cost.
Sl.No	Description								
8.1	Manufacturers shall guarantee that Battery shall meet the specified duty cycle requirements at the specified minimum electrolytic temperature as stipulated in this specification and as confirmed by them in technical data sheets. In case, the performance of battery at site is not as per the performance guarantee, the manufacturer should replace the Battery at site free of cost.								
9.0 <u>TESTING REQUIREMENTS</u>									
<table><tr><td>9.1</td><td>Test Requirements</td><td> • All Acceptance and Routine tests as per latest editions of relevant IS/IEC standards whichever is stringent shall be carried out by manufacturer at manufacturer works. • A copy of above test results shall be submitted for approval before the dispatch of batteries. Specified number of bound copies of complete test results shall be furnished with the batteries. • Purchaser (BHEL/End User) will witness all the tests at OEM’s works and bidder to intimate purchaser about the schedule of tests with 4 weeks prior notice. • Sampling scheme and criteria for Acceptance tests shall be as per IS/IEC which ever stringent. </td></tr></table>						9.1	Test Requirements	• All Acceptance and Routine tests as per latest editions of relevant IS/IEC standards whichever is stringent shall be carried out by manufacturer at manufacturer works. • A copy of above test results shall be submitted for approval before the dispatch of batteries. Specified number of bound copies of complete test results shall be furnished with the batteries. • Purchaser (BHEL/End User) will witness all the tests at OEM’s works and bidder to intimate purchaser about the schedule of tests with 4 weeks prior notice. • Sampling scheme and criteria for Acceptance tests shall be as per IS/IEC which ever stringent.	
9.1	Test Requirements	• All Acceptance and Routine tests as per latest editions of relevant IS/IEC standards whichever is stringent shall be carried out by manufacturer at manufacturer works. • A copy of above test results shall be submitted for approval before the dispatch of batteries. Specified number of bound copies of complete test results shall be furnished with the batteries. • Purchaser (BHEL/End User) will witness all the tests at OEM’s works and bidder to intimate purchaser about the schedule of tests with 4 weeks prior notice. • Sampling scheme and criteria for Acceptance tests shall be as per IS/IEC which ever stringent.							
Ref. Doc									

TD- Rev No. 00	Form No.  HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		PY 55027
				Rev No.00
				PAGE 12 of 17
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		9.2	Test Facility	- All the tests shall be carried out in an authorized Laboratory at manufacturer works. The laboratory shall have national/international accreditation. - If the Lab facility does not meet the criteria and are not to the satisfaction of the purchaser, the test shall be carried out in a third part accredited Lab such as NABL, ERDA/CPRI etc. - Manufacturer shall furnish details of test Lab facility including traceability and their accreditations.
		9.3	Type test Certificates	- Type test Certificates of the following tests as per relevant IS/IEC standard shall be submitted for purchaser's review. - Verification of constructional requirements. - Verification of marking - Verification of dimensions - Test for capacity - Tests for loss of capacity on storage (Charge retention test) - Ampere-hour and watt-hour efficiency tests - Endurance tests - Short circuit current and internal resistance measurement test as per IEC-60896-1 - Test for suitability for floating operation. As per IEC-60896-1. - Test certificates for the type tests should be for the test conducted on the equipment similar design, type & rating to those proposed to be supplied under the present contract. - However if the contractor is not able to submit report of the type test(s) or in the case of type test report(s) are not found to be meeting the specification requirements, the manufacturer 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. - Type tests to be performed further as required by owner shall be referred to Annexure-A.
		9.4	Site Acceptance Tests:	
		a)	General	The following minimum tests/ checks shall be conducted at site. Any other tests/ checks as per the manufacturer's recommendation shall also be carried out.
		b)	Tests	- Marking and packing - Verification of dimensions - Test for capacity - Test for voltages during discharge. - Battery duty cycle test to meet the load cycle
Ref. Doc				

TD- Rev No. 00	Form No.	 HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		PY 55027																																																																																																																																																											
					Rev No.00																																																																																																																																																											
					PAGE 14 of 17																																																																																																																																																											
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company. 12.0 DATA SHEET (To be filled by manufacturer)																																																																																																																																																																
<table border="1"> <thead> <tr> <th>Sl. No</th> <th>Description</th> <th>Units</th> <th></th> <th></th> </tr> </thead> <tbody> <tr><td>1.</td><td>Battery Type</td><td></td><td></td><td></td></tr> <tr><td>2.</td><td>Tag no. of the battery</td><td></td><td></td><td></td></tr> <tr><td>3.</td><td>Manufacturer name</td><td></td><td></td><td></td></tr> <tr><td>4.</td><td>Type and manufacturer Model no</td><td></td><td></td><td></td></tr> <tr><td>5.</td><td>Applicable standard</td><td></td><td></td><td></td></tr> <tr><td>6.</td><td>Average life</td><td>Years</td><td></td><td></td></tr> <tr><td>7.</td><td>Ampere hour capacity at 27⁰C and end cell voltage</td><td>Ah</td><td></td><td></td></tr> <tr><td>8.</td><td>AH efficiency at 10hr rate</td><td>%</td><td></td><td></td></tr> <tr><td>9.</td><td>Short circuit current of the battery bank</td><td>kAmperes</td><td></td><td></td></tr> <tr><td>10.</td><td>Short circuit withstand time</td><td>Sec</td><td></td><td></td></tr> <tr><td>11.</td><td>Max. Allowable temp. of electrolyte which the cells can withstand without injurious effects</td><td></td><td></td><td></td></tr> <tr><td></td><td>a. Continuously</td><td></td><td></td><td></td></tr> <tr><td></td><td>b. For short periods</td><td></td><td></td><td></td></tr> <tr><td>12.</td><td>Cell voltage at end of full discharge at 10 hours rate</td><td>Volts/cell</td><td></td><td></td></tr> <tr><td>13.</td><td>Ampere-hour capacity at min. ambient temperature of 0⁰C at End Cell Voltage (ECV)</td><td>Ah</td><td></td><td></td></tr> <tr><td>14.</td><td>Ampere-hour capacity at ambient temperature of 27⁰C at ECV</td><td>Ah</td><td></td><td></td></tr> <tr><td>15.</td><td>Discharge rates</td><td></td><td></td><td></td></tr> <tr><td>a)</td><td>Ah capacity at one minute rate.</td><td>Ah</td><td></td><td></td></tr> <tr><td>b)</td><td>Ah capacity at 30 minute rate.</td><td>Ah</td><td></td><td></td></tr> <tr><td>c)</td><td>Ah capacity at 60 minute rate.</td><td>Ah</td><td></td><td></td></tr> <tr><td>d)</td><td>Ah capacity at 2 hour rate</td><td>Ah</td><td></td><td></td></tr> <tr><td>e)</td><td>Ah capacity at 5 hour rate</td><td>Ah</td><td></td><td></td></tr> <tr><td>f)</td><td>Ah capacity at 10 hour rate</td><td>Ah</td><td></td><td></td></tr> <tr><td>16.</td><td>Boost/Quick charging current</td><td></td><td></td><td></td></tr> <tr><td>a)</td><td>Max. Safe boost charging current.</td><td>Amperes</td><td></td><td></td></tr> <tr><td>b)</td><td>Recommended Boost charger rating in 8/10 hours</td><td>Amperes</td><td></td><td></td></tr> <tr><td>c)</td><td>Permissible ripple content acceptable to battery</td><td>%</td><td></td><td></td></tr> <tr><td>17.</td><td>Boost/Quick charging voltage</td><td></td><td></td><td></td></tr> <tr><td>a)</td><td>Max. Boost charging voltage per cell</td><td>Volts</td><td></td><td></td></tr> <tr><td>b)</td><td>Recommended Boost charging</td><td>Volts</td><td></td><td></td></tr> </tbody> </table>						Sl. No	Description	Units			1.	Battery Type				2.	Tag no. of the battery				3.	Manufacturer name				4.	Type and manufacturer Model no				5.	Applicable standard				6.	Average life	Years			7.	Ampere hour capacity at 27 ⁰ C and end cell voltage	Ah			8.	AH efficiency at 10hr rate	%			9.	Short circuit current of the battery bank	kAmperes			10.	Short circuit withstand time	Sec			11.	Max. Allowable temp. of electrolyte which the cells can withstand without injurious effects					a. Continuously					b. For short periods				12.	Cell voltage at end of full discharge at 10 hours rate	Volts/cell			13.	Ampere-hour capacity at min. ambient temperature of 0 ⁰ C at End Cell Voltage (ECV)	Ah			14.	Ampere-hour capacity at ambient temperature of 27 ⁰ C at ECV	Ah			15.	Discharge rates				a)	Ah capacity at one minute rate.	Ah			b)	Ah capacity at 30 minute rate.	Ah			c)	Ah capacity at 60 minute rate.	Ah			d)	Ah capacity at 2 hour rate	Ah			e)	Ah capacity at 5 hour rate	Ah			f)	Ah capacity at 10 hour rate	Ah			16.	Boost/Quick charging current				a)	Max. Safe boost charging current.	Amperes			b)	Recommended Boost charger rating in 8/10 hours	Amperes			c)	Permissible ripple content acceptable to battery	%			17.	Boost/Quick charging voltage				a)	Max. Boost charging voltage per cell	Volts			b)	Recommended Boost charging	Volts		
Sl. No	Description	Units																																																																																																																																																														
1.	Battery Type																																																																																																																																																															
2.	Tag no. of the battery																																																																																																																																																															
3.	Manufacturer name																																																																																																																																																															
4.	Type and manufacturer Model no																																																																																																																																																															
5.	Applicable standard																																																																																																																																																															
6.	Average life	Years																																																																																																																																																														
7.	Ampere hour capacity at 27 ⁰ C and end cell voltage	Ah																																																																																																																																																														
8.	AH efficiency at 10hr rate	%																																																																																																																																																														
9.	Short circuit current of the battery bank	kAmperes																																																																																																																																																														
10.	Short circuit withstand time	Sec																																																																																																																																																														
11.	Max. Allowable temp. of electrolyte which the cells can withstand without injurious effects																																																																																																																																																															
	a. Continuously																																																																																																																																																															
	b. For short periods																																																																																																																																																															
12.	Cell voltage at end of full discharge at 10 hours rate	Volts/cell																																																																																																																																																														
13.	Ampere-hour capacity at min. ambient temperature of 0 ⁰ C at End Cell Voltage (ECV)	Ah																																																																																																																																																														
14.	Ampere-hour capacity at ambient temperature of 27 ⁰ C at ECV	Ah																																																																																																																																																														
15.	Discharge rates																																																																																																																																																															
a)	Ah capacity at one minute rate.	Ah																																																																																																																																																														
b)	Ah capacity at 30 minute rate.	Ah																																																																																																																																																														
c)	Ah capacity at 60 minute rate.	Ah																																																																																																																																																														
d)	Ah capacity at 2 hour rate	Ah																																																																																																																																																														
e)	Ah capacity at 5 hour rate	Ah																																																																																																																																																														
f)	Ah capacity at 10 hour rate	Ah																																																																																																																																																														
16.	Boost/Quick charging current																																																																																																																																																															
a)	Max. Safe boost charging current.	Amperes																																																																																																																																																														
b)	Recommended Boost charger rating in 8/10 hours	Amperes																																																																																																																																																														
c)	Permissible ripple content acceptable to battery	%																																																																																																																																																														
17.	Boost/Quick charging voltage																																																																																																																																																															
a)	Max. Boost charging voltage per cell	Volts																																																																																																																																																														
b)	Recommended Boost charging	Volts																																																																																																																																																														
Ref. Doc																																																																																																																																																																

TD- Rev No. 00	Form No.  HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD			PY 55027																																																																																																																																																																					
					Rev No.00																																																																																																																																																																					
					PAGE 15 of 17																																																																																																																																																																					
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;"></td> <td style="width: 55%;">voltage per cell for constant voltage finishing charging</td> <td style="width: 10%;"></td> <td style="width: 15%;"></td> <td style="width: 15%;"></td> </tr> <tr> <td>18.</td> <td>Float charging voltage per cell</td> <td></td> <td></td> <td></td> </tr> <tr> <td>a)</td> <td>Max. float charging voltage per cell</td> <td>Volts</td> <td></td> <td></td> </tr> <tr> <td>b)</td> <td>Recommended float charging voltage range per cell for constant voltage finishing charging</td> <td>Volts</td> <td></td> <td></td> </tr> <tr> <td>19.</td> <td>Float charging current</td> <td></td> <td></td> <td></td> </tr> <tr> <td>a)</td> <td>Max. float charging current</td> <td>Volts</td> <td></td> <td></td> </tr> <tr> <td>b)</td> <td>Float charging current range</td> <td>Amperes</td> <td></td> <td></td> </tr> <tr> <td>c)</td> <td>Permissible ripple content acceptable to battery</td> <td>%</td> <td></td> <td></td> </tr> <tr> <td>20.</td> <td>Recommended Equilibrium/Trickle charging current of the battery</td> <td>mA</td> <td></td> <td></td> </tr> <tr> <td>21.</td> <td>Battery cell Plate Details</td> <td></td> <td></td> <td></td> </tr> <tr> <td>a)</td> <td>Type and material of positive plate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>b)</td> <td>Type and material of negative plate</td> <td></td> <td></td> <td></td> </tr> <tr> <td>c)</td> <td>No. of positive plates per cell</td> <td>Nos.</td> <td></td> <td></td> </tr> <tr> <td>d)</td> <td>No. of negative plates per cell</td> <td>Nos.</td> <td></td> <td></td> </tr> <tr> <td>22.</td> <td>Separator Details</td> <td></td> <td></td> <td></td> </tr> <tr> <td>a)</td> <td>Type of Separators</td> <td></td> <td></td> <td></td> </tr> <tr> <td>b)</td> <td>Material</td> <td></td> <td></td> <td></td> </tr> <tr> <td>c)</td> <td>Thickness</td> <td></td> <td></td> <td></td> </tr> <tr> <td>23.</td> <td>Connectors Details</td> <td></td> <td></td> <td></td> </tr> <tr> <td>a)</td> <td>Type of Inter-cell connectors</td> <td></td> <td></td> <td></td> </tr> <tr> <td>b)</td> <td>Type of Inter-row connectors</td> <td></td> <td></td> <td></td> </tr> <tr> <td>c)</td> <td>Total Resistance of the connectors</td> <td></td> <td></td> <td></td> </tr> <tr> <td>24.</td> <td>Cell details</td> <td></td> <td></td> <td></td> </tr> <tr> <td>a)</td> <td>No. of cells per battery</td> <td></td> <td></td> <td></td> </tr> <tr> <td>b)</td> <td>Taps provided at cell No.</td> <td></td> <td></td> <td></td> </tr> <tr> <td>c)</td> <td>Type of cell and designation</td> <td></td> <td></td> <td></td> </tr> <tr> <td>d)</td> <td>Material of the container</td> <td></td> <td></td> <td></td> </tr> <tr> <td>e)</td> <td>Type of the container</td> <td></td> <td></td> <td></td> </tr> <tr> <td>f)</td> <td>Cell dimensions a. Width b. Length c. Depth</td> <td>mm mm mm</td> <td></td> <td></td> </tr> <tr> <td>25.</td> <td>Electrolyte</td> <td></td> <td></td> <td></td> </tr> <tr> <td>a)</td> <td>Confirms to IS-266/IEC</td> <td>Yes/No</td> <td></td> <td></td> </tr> <tr> <td>b)</td> <td>Amount of electrolyte for first filling per cell per set.</td> <td>(Liters)</td> <td></td> <td></td> </tr> <tr> <td>c)</td> <td>Specific gravity of electrolyte at the</td> <td></td> <td></td> <td></td> </tr> </table>							voltage per cell for constant voltage finishing charging				18.	Float charging voltage per cell				a)	Max. float charging voltage per cell	Volts			b)	Recommended float charging voltage range per cell for constant voltage finishing charging	Volts			19.	Float charging current				a)	Max. float charging current	Volts			b)	Float charging current range	Amperes			c)	Permissible ripple content acceptable to battery	%			20.	Recommended Equilibrium/Trickle charging current of the battery	mA			21.	Battery cell Plate Details				a)	Type and material of positive plate				b)	Type and material of negative plate				c)	No. of positive plates per cell	Nos.			d)	No. of negative plates per cell	Nos.			22.	Separator Details				a)	Type of Separators				b)	Material				c)	Thickness				23.	Connectors Details				a)	Type of Inter-cell connectors				b)	Type of Inter-row connectors				c)	Total Resistance of the connectors				24.	Cell details				a)	No. of cells per battery				b)	Taps provided at cell No.				c)	Type of cell and designation				d)	Material of the container				e)	Type of the container				f)	Cell dimensions a. Width b. Length c. Depth	mm mm mm			25.	Electrolyte				a)	Confirms to IS-266/IEC	Yes/No			b)	Amount of electrolyte for first filling per cell per set.	(Liters)			c)	Specific gravity of electrolyte at the			
	voltage per cell for constant voltage finishing charging																																																																																																																																																																									
18.	Float charging voltage per cell																																																																																																																																																																									
a)	Max. float charging voltage per cell	Volts																																																																																																																																																																								
b)	Recommended float charging voltage range per cell for constant voltage finishing charging	Volts																																																																																																																																																																								
19.	Float charging current																																																																																																																																																																									
a)	Max. float charging current	Volts																																																																																																																																																																								
b)	Float charging current range	Amperes																																																																																																																																																																								
c)	Permissible ripple content acceptable to battery	%																																																																																																																																																																								
20.	Recommended Equilibrium/Trickle charging current of the battery	mA																																																																																																																																																																								
21.	Battery cell Plate Details																																																																																																																																																																									
a)	Type and material of positive plate																																																																																																																																																																									
b)	Type and material of negative plate																																																																																																																																																																									
c)	No. of positive plates per cell	Nos.																																																																																																																																																																								
d)	No. of negative plates per cell	Nos.																																																																																																																																																																								
22.	Separator Details																																																																																																																																																																									
a)	Type of Separators																																																																																																																																																																									
b)	Material																																																																																																																																																																									
c)	Thickness																																																																																																																																																																									
23.	Connectors Details																																																																																																																																																																									
a)	Type of Inter-cell connectors																																																																																																																																																																									
b)	Type of Inter-row connectors																																																																																																																																																																									
c)	Total Resistance of the connectors																																																																																																																																																																									
24.	Cell details																																																																																																																																																																									
a)	No. of cells per battery																																																																																																																																																																									
b)	Taps provided at cell No.																																																																																																																																																																									
c)	Type of cell and designation																																																																																																																																																																									
d)	Material of the container																																																																																																																																																																									
e)	Type of the container																																																																																																																																																																									
f)	Cell dimensions a. Width b. Length c. Depth	mm mm mm																																																																																																																																																																								
25.	Electrolyte																																																																																																																																																																									
a)	Confirms to IS-266/IEC	Yes/No																																																																																																																																																																								
b)	Amount of electrolyte for first filling per cell per set.	(Liters)																																																																																																																																																																								
c)	Specific gravity of electrolyte at the																																																																																																																																																																									
Ref. Doc																																																																																																																																																																										

TD- Rev No. 00	Form No.  HYDERABAD	PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD			PY 55027																																																																																																				
					Rev No.00																																																																																																				
					PAGE 16 of 17																																																																																																				
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company. <table border="1"> <tr> <td></td> <td>end of full charging at 27⁰ C</td> <td></td> <td></td> <td></td> </tr> <tr> <td>d)</td> <td>Specific gravity of electrolyte at the end of full discharging at 10 hours/5 hours rate at 27⁰ C</td> <td></td> <td></td> <td></td> </tr> <tr> <td>26.</td> <td>Racks</td> <td></td> <td></td> <td></td> </tr> <tr> <td>a)</td> <td>Type and Material of the rack</td> <td></td> <td></td> <td></td> </tr> <tr> <td>b)</td> <td>Overall dimension of the rack</td> <td>(L X B X H) mm</td> <td></td> <td></td> </tr> <tr> <td>c)</td> <td>Net weight of rack</td> <td>Kg</td> <td></td> <td></td> </tr> <tr> <td>g)</td> <td>Weight of complete cell with electrolyte</td> <td>Kg</td> <td></td> <td></td> </tr> <tr> <td>h)</td> <td>Weight of complete cell without electrolyte</td> <td>Kg</td> <td></td> <td></td> </tr> <tr> <td>i)</td> <td>Rack dry weight</td> <td>Kg</td> <td></td> <td></td> </tr> <tr> <td>j)</td> <td>Net rack weight with electrolyte</td> <td>Kg</td> <td></td> <td></td> </tr> <tr> <td>k)</td> <td>Total shipping weight of one battery unit (without electrolyte)</td> <td>Kg</td> <td></td> <td></td> </tr> <tr> <td>27.</td> <td>Insulator material for</td> <td></td> <td></td> <td></td> </tr> <tr> <td>a)</td> <td>Cells</td> <td></td> <td></td> <td></td> </tr> <tr> <td>b)</td> <td>Racks</td> <td></td> <td></td> <td></td> </tr> <tr> <td>28.</td> <td>Inter-row and inter-tier connection</td> <td></td> <td></td> <td></td> </tr> <tr> <td>a)</td> <td>Material and quantity</td> <td></td> <td></td> <td></td> </tr> <tr> <td>29.</td> <td>Terminal post</td> <td></td> <td></td> <td></td> </tr> <tr> <td>a)</td> <td>Material</td> <td></td> <td></td> <td></td> </tr> <tr> <td>30.</td> <td>Recommended size of Bus bar/cable</td> <td></td> <td></td> <td></td> </tr> <tr> <td>31.</td> <td>Hydrogen evaluation</td> <td></td> <td></td> <td></td> </tr> </table>							end of full charging at 27 ⁰ C				d)	Specific gravity of electrolyte at the end of full discharging at 10 hours/5 hours rate at 27 ⁰ C				26.	Racks				a)	Type and Material of the rack				b)	Overall dimension of the rack	(L X B X H) mm			c)	Net weight of rack	Kg			g)	Weight of complete cell with electrolyte	Kg			h)	Weight of complete cell without electrolyte	Kg			i)	Rack dry weight	Kg			j)	Net rack weight with electrolyte	Kg			k)	Total shipping weight of one battery unit (without electrolyte)	Kg			27.	Insulator material for				a)	Cells				b)	Racks				28.	Inter-row and inter-tier connection				a)	Material and quantity				29.	Terminal post				a)	Material				30.	Recommended size of Bus bar/cable				31.	Hydrogen evaluation			
	end of full charging at 27 ⁰ C																																																																																																								
d)	Specific gravity of electrolyte at the end of full discharging at 10 hours/5 hours rate at 27 ⁰ C																																																																																																								
26.	Racks																																																																																																								
a)	Type and Material of the rack																																																																																																								
b)	Overall dimension of the rack	(L X B X H) mm																																																																																																							
c)	Net weight of rack	Kg																																																																																																							
g)	Weight of complete cell with electrolyte	Kg																																																																																																							
h)	Weight of complete cell without electrolyte	Kg																																																																																																							
i)	Rack dry weight	Kg																																																																																																							
j)	Net rack weight with electrolyte	Kg																																																																																																							
k)	Total shipping weight of one battery unit (without electrolyte)	Kg																																																																																																							
27.	Insulator material for																																																																																																								
a)	Cells																																																																																																								
b)	Racks																																																																																																								
28.	Inter-row and inter-tier connection																																																																																																								
a)	Material and quantity																																																																																																								
29.	Terminal post																																																																																																								
a)	Material																																																																																																								
30.	Recommended size of Bus bar/cable																																																																																																								
31.	Hydrogen evaluation																																																																																																								
Ref. Doc																																																																																																									

ID- Rev No. 00	Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE –A Rev No.00 PAGE 1 of 14
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		<u>ANNEXURE-A</u> (THIS DOCUMENT SHALL BE READ IN CONJUNCTION WITH LEAD ACID BATTERY MAIN SPECIFICATION-PY55027)		
Ref. Doc				

TD- Rev No. 00	Form No.		PRODUCT STANDARD	ANNEXURE –A
			PROJECT ENGINEERING & SYSTEMS DIVISION	Rev No.00
			HYDERABAD	PAGE 2 of 14
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		<u>CONTENTS</u> 1. SITE CONDITIONS & TECHNICAL REQUIREMENTS 2. LOAD DUTY CYCLE 3. ADDITIONAL REQUIREMENTS (PROJECT SPECIFIC) 4. DOCUMENTATION 5. AS-BUILT DRAWINGS 6. MANDATORY SPARES 7. PRICE FORMAT 8. DEVIATION SCHEDULE (TECHNICAL) 9. CHECK LIST		
Ref. Doc				

TD- Rev No. 00	Form No.		PRODUCT STANDARD		ANNEXURE –A																																																																																												
			PROJECT ENGINEERING & SYSTEMS DIVISION		Rev No.00																																																																																												
			HYDERABAD		PAGE 3 of 14																																																																																												
The following details are project specific data for Battery. Please refer to the particular main specification of the respective battery for details of technical requirements as applicable. In case of conflict between requirements in technical specification, this <u>Annexure-A</u> requirements shall supersede the main Battery specification.																																																																																																	
<u>PROJECT SPECIFIC PURCHASER'S DATA</u>																																																																																																	
1. DATA SHEET -1																																																																																																	
<table border="1"> <thead> <tr> <th>Sl. No</th> <th>Description</th> <th>Unit</th> <th></th> </tr> </thead> <tbody> <tr> <td></td> <td>Name of the customer</td> <td colspan="2">TATA STEEL LIMITED, JAMSHEDPUR</td> </tr> <tr> <td></td> <td>Consultant Name</td> <td colspan="2">Tata Consulting Engineers Limited</td> </tr> <tr> <td></td> <td>Project Name</td> <td colspan="2">1 X 40 MW CAPTIVE POWER PLANT FOR CDQ 10&11</td> </tr> <tr> <td>A.</td> <td colspan="3">Site conditions</td> </tr> <tr> <td>1.</td> <td>Ambient temperature</td> <td></td> <td></td> </tr> <tr> <td></td> <td>a. Minimum temp. for battery sizing</td> <td>°C</td> <td>4</td> </tr> <tr> <td></td> <td>b. Maximum</td> <td>°C</td> <td>50</td> </tr> <tr> <td>2.</td> <td>Design ambient temperature</td> <td>°C</td> <td>40</td> </tr> <tr> <td>3.</td> <td>Atmosphere</td> <td></td> <td>Industrial Conductive/ Dusty</td> </tr> <tr> <td>4.</td> <td>Altitude above MSL</td> <td>meters</td> <td>129</td> </tr> <tr> <td>5.</td> <td>Location</td> <td></td> <td>Tata Steel Works - Jamshedpur</td> </tr> <tr> <td>6.</td> <td>Relative Humidity Range</td> <td>%</td> <td>53 (Average)</td> </tr> <tr> <td>7.</td> <td>Seismic zone</td> <td></td> <td>As per IS:1893-2002, Zone-II.</td> </tr> <tr> <td>B.</td> <td colspan="3">Technical requirements</td> </tr> <tr> <td>1.</td> <td>Application of Battery</td> <td>DC/UPS</td> <td>DC</td> </tr> <tr> <td>2.</td> <td>Rated DC system voltage</td> <td>Volts</td> <td>220</td> </tr> <tr> <td>3.</td> <td>Type of battery</td> <td></td> <td>Lead Acid Plante</td> </tr> <tr> <td>4.</td> <td>Plate construction</td> <td></td> <td>Plante formation</td> </tr> <tr> <td>5.</td> <td>Discharge type</td> <td></td> <td>High Discharge</td> </tr> <tr> <td>6.</td> <td>Quantity of all battery banks</td> <td>Set's</td> <td>2 No's</td> </tr> <tr> <td>7.</td> <td>Battery capacity</td> <td></td> <td>Bidder to furnish quoted AH capacity and battery sizing as per LOAD DUTY CYCLE.</td> </tr> <tr> <td>8.</td> <td>Nominal Float</td> <td>Volts</td> <td>2.25</td> </tr> </tbody> </table>						Sl. No	Description	Unit			Name of the customer	TATA STEEL LIMITED, JAMSHEDPUR			Consultant Name	Tata Consulting Engineers Limited			Project Name	1 X 40 MW CAPTIVE POWER PLANT FOR CDQ 10&11		A.	Site conditions			1.	Ambient temperature				a. Minimum temp. for battery sizing	°C	4		b. Maximum	°C	50	2.	Design ambient temperature	°C	40	3.	Atmosphere		Industrial Conductive/ Dusty	4.	Altitude above MSL	meters	129	5.	Location		Tata Steel Works - Jamshedpur	6.	Relative Humidity Range	%	53 (Average)	7.	Seismic zone		As per IS:1893-2002, Zone-II.	B.	Technical requirements			1.	Application of Battery	DC/UPS	DC	2.	Rated DC system voltage	Volts	220	3.	Type of battery		Lead Acid Plante	4.	Plate construction		Plante formation	5.	Discharge type		High Discharge	6.	Quantity of all battery banks	Set's	2 No's	7.	Battery capacity		Bidder to furnish quoted AH capacity and battery sizing as per LOAD DUTY CYCLE.	8.	Nominal Float	Volts	2.25
Sl. No	Description	Unit																																																																																															
	Name of the customer	TATA STEEL LIMITED, JAMSHEDPUR																																																																																															
	Consultant Name	Tata Consulting Engineers Limited																																																																																															
	Project Name	1 X 40 MW CAPTIVE POWER PLANT FOR CDQ 10&11																																																																																															
A.	Site conditions																																																																																																
1.	Ambient temperature																																																																																																
	a. Minimum temp. for battery sizing	°C	4																																																																																														
	b. Maximum	°C	50																																																																																														
2.	Design ambient temperature	°C	40																																																																																														
3.	Atmosphere		Industrial Conductive/ Dusty																																																																																														
4.	Altitude above MSL	meters	129																																																																																														
5.	Location		Tata Steel Works - Jamshedpur																																																																																														
6.	Relative Humidity Range	%	53 (Average)																																																																																														
7.	Seismic zone		As per IS:1893-2002, Zone-II.																																																																																														
B.	Technical requirements																																																																																																
1.	Application of Battery	DC/UPS	DC																																																																																														
2.	Rated DC system voltage	Volts	220																																																																																														
3.	Type of battery		Lead Acid Plante																																																																																														
4.	Plate construction		Plante formation																																																																																														
5.	Discharge type		High Discharge																																																																																														
6.	Quantity of all battery banks	Set's	2 No's																																																																																														
7.	Battery capacity		Bidder to furnish quoted AH capacity and battery sizing as per LOAD DUTY CYCLE.																																																																																														
8.	Nominal Float	Volts	2.25																																																																																														
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.	Ref. Doc																																																																																																

TD- Rev No. 00	Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		ANNEXURE –A																																																																																																													
					Rev No.00																																																																																																													
					PAGE 4 of 14																																																																																																													
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		<table border="1"> <tr> <td></td> <td colspan="2">Voltage</td> <td></td> <td colspan="2"></td> </tr> <tr> <td>9.</td> <td>Boost Voltage</td> <td>Volts</td> <td colspan="3">Bidder to furnish the detail along with offer</td> </tr> <tr> <td>10.</td> <td>Battery Configuration</td> <td></td> <td colspan="3">2X100%</td> </tr> <tr> <td>11.</td> <td>Tap cell</td> <td>No.</td> <td colspan="3">80% of total no.of cells i.e 87</td> </tr> <tr> <td>12.</td> <td>Battery delivery condition to site</td> <td>Charged/ Uncharged</td> <td colspan="3">Dry Uncharged</td> </tr> <tr> <td>13.</td> <td>Battery cell container type</td> <td></td> <td colspan="3">Transparent halogen-free SAN container</td> </tr> <tr> <td>14.</td> <td>Boost charging time</td> <td></td> <td colspan="3">Bidder to furnish the detail along with offer</td> </tr> <tr> <td>15.</td> <td>Recommended boost charging rate</td> <td></td> <td colspan="3">Bidder to furnish the detail along with offer</td> </tr> <tr> <td>16.</td> <td>Recommended trickle charging rate</td> <td></td> <td colspan="3">Bidder to furnish the detail along with offer</td> </tr> <tr> <td>17.</td> <td>Type of inter cell connectors</td> <td></td> <td colspan="3">Lead Plated Copper connectors or a better product</td> </tr> <tr> <td>18.</td> <td>Battery stand type</td> <td>Mild Steel/ Teak wood</td> <td colspan="3"> Not applicable. End user keeping the battery cells on brick wall structure. Bidder to provide the layout requirements accordingly. (*) </td> </tr> <tr> <td>19.</td> <td>Battery stand/rack formation</td> <td></td> <td colspan="3">Not applicable.</td> </tr> <tr> <td>20.</td> <td>Paint shade of the rack</td> <td></td> <td colspan="3">Not applicable.</td> </tr> <tr> <td>21.</td> <td>Type tests requirement</td> <td></td> <td colspan="3">1. Type test reports (for the type tests indicated in the main specification as per latest editions of IS: 1652 & IEC) not older than 5 years shall be submitted.</td> </tr> <tr> <td>22.</td> <td>Sea Worthy Packing</td> <td></td> <td colspan="3">Bidder to furnish the detail along with offer</td> </tr> <tr> <td>23.</td> <td colspan="5">Cable termination details(Tentative)</td> </tr> <tr> <td></td> <td><i>From</i></td> <td><i>To</i></td> <td><i>Cable type</i></td> <td><i>Over all Diameter (mm)</i></td> <td><i>Cable route length (meters)</i></td> </tr> <tr> <td></td> <td>Battery</td> <td>DCDB through isolation</td> <td>1X70 Sq.mm Cu Single core cable, 2 runs/pole</td> <td></td> <td></td> </tr> </table>						Voltage					9.	Boost Voltage	Volts	Bidder to furnish the detail along with offer			10.	Battery Configuration		2X100%			11.	Tap cell	No.	80% of total no.of cells i.e 87			12.	Battery delivery condition to site	Charged/ Uncharged	Dry Uncharged			13.	Battery cell container type		Transparent halogen-free SAN container			14.	Boost charging time		Bidder to furnish the detail along with offer			15.	Recommended boost charging rate		Bidder to furnish the detail along with offer			16.	Recommended trickle charging rate		Bidder to furnish the detail along with offer			17.	Type of inter cell connectors		Lead Plated Copper connectors or a better product			18.	Battery stand type	Mild Steel/ Teak wood	Not applicable. End user keeping the battery cells on brick wall structure. Bidder to provide the layout requirements accordingly. (*)			19.	Battery stand/rack formation		Not applicable.			20.	Paint shade of the rack		Not applicable.			21.	Type tests requirement		1. Type test reports (for the type tests indicated in the main specification as per latest editions of IS: 1652 & IEC) not older than 5 years shall be submitted.			22.	Sea Worthy Packing		Bidder to furnish the detail along with offer			23.	Cable termination details(Tentative)						<i>From</i>	<i>To</i>	<i>Cable type</i>	<i>Over all Diameter (mm)</i>	<i>Cable route length (meters)</i>		Battery	DCDB through isolation	1X70 Sq.mm Cu Single core cable, 2 runs/pole		
			Voltage																																																																																																															
		9.	Boost Voltage	Volts	Bidder to furnish the detail along with offer																																																																																																													
		10.	Battery Configuration		2X100%																																																																																																													
		11.	Tap cell	No.	80% of total no.of cells i.e 87																																																																																																													
		12.	Battery delivery condition to site	Charged/ Uncharged	Dry Uncharged																																																																																																													
		13.	Battery cell container type		Transparent halogen-free SAN container																																																																																																													
		14.	Boost charging time		Bidder to furnish the detail along with offer																																																																																																													
		15.	Recommended boost charging rate		Bidder to furnish the detail along with offer																																																																																																													
		16.	Recommended trickle charging rate		Bidder to furnish the detail along with offer																																																																																																													
		17.	Type of inter cell connectors		Lead Plated Copper connectors or a better product																																																																																																													
		18.	Battery stand type	Mild Steel/ Teak wood	Not applicable. End user keeping the battery cells on brick wall structure. Bidder to provide the layout requirements accordingly. (*)																																																																																																													
		19.	Battery stand/rack formation		Not applicable.																																																																																																													
		20.	Paint shade of the rack		Not applicable.																																																																																																													
		21.	Type tests requirement		1. Type test reports (for the type tests indicated in the main specification as per latest editions of IS: 1652 & IEC) not older than 5 years shall be submitted.																																																																																																													
		22.	Sea Worthy Packing		Bidder to furnish the detail along with offer																																																																																																													
		23.	Cable termination details(Tentative)																																																																																																															
			<i>From</i>	<i>To</i>	<i>Cable type</i>	<i>Over all Diameter (mm)</i>	<i>Cable route length (meters)</i>																																																																																																											
			Battery	DCDB through isolation	1X70 Sq.mm Cu Single core cable, 2 runs/pole																																																																																																													
		Ref. Doc																																																																																																																

TD- Rev No. 00 Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		ANNEXURE –A Rev No.00 PAGE 5 of 14																																		
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.	box/charger																																					
	(*) Bidder shall provide necessary input for civil design of the brick supporting structure. Bidder to also consider the battery fixing / placing arrangement with the supporting structure and provide a typical drawing showing battery fixing arrangement with the brick structure.																																					
	2. <u>LOAD DUTY CYCLE</u>																																					
	<table border="1"> <tr> <td>2.1</td> <td colspan="5"><u>Duty Cycle of the Battery</u></td> </tr> <tr> <td></td> <td>Time (in minutes)</td> <td>1</td> <td>119</td> <td>479</td> <td>1</td> </tr> <tr> <td></td> <td>Current (A)</td> <td>384.39</td> <td>205.36</td> <td>35.82</td> <td>46.77</td> </tr> </table>					2.1	<u>Duty Cycle of the Battery</u>						Time (in minutes)	1	119	479	1		Current (A)	384.39	205.36	35.82	46.77															
	2.1	<u>Duty Cycle of the Battery</u>																																				
		Time (in minutes)	1	119	479	1																																
		Current (A)	384.39	205.36	35.82	46.77																																
	2.2 <u>Factors to be considered for Battery sizing</u>																																					
	<table border="1"> <tr> <th>Sl.No</th> <th>Parameter description</th> <th>Parameter value</th> </tr> <tr> <td>1.</td> <td>DC System Voltage</td> <td>220 V</td> </tr> <tr> <td>2.</td> <td>Allowable Voltage Variation</td> <td>+10% to -15%</td> </tr> <tr> <td>3.</td> <td>Design margin</td> <td><u>10%</u></td> </tr> <tr> <td>4.</td> <td>Aging factor</td> <td><u>1</u></td> </tr> <tr> <td>5.</td> <td>Cable voltage drop to be considered for Battery Sizing</td> <td><u>6.6V</u></td> </tr> <tr> <td>6.</td> <td>Min. Electrolytic temp</td> <td><u>4 deg c</u></td> </tr> <tr> <td>7.</td> <td>Temperature correction factors</td> <td>IEEE 485 shall be the principle for sizing the battery including temperature correction factor.</td> </tr> <tr> <td>8.</td> <td>Float Voltage</td> <td>2.25 V/Cell</td> </tr> <tr> <td>9.</td> <td>End Cell Voltage</td> <td>1.85 V/Cell</td> </tr> <tr> <td>10.</td> <td>No.of Cells/Battery bank</td> <td>108</td> </tr> </table>					Sl.No	Parameter description	Parameter value	1.	DC System Voltage	220 V	2.	Allowable Voltage Variation	+10% to -15%	3.	Design margin	<u>10%</u>	4.	Aging factor	<u>1</u>	5.	Cable voltage drop to be considered for Battery Sizing	<u>6.6V</u>	6.	Min. Electrolytic temp	<u>4 deg c</u>	7.	Temperature correction factors	IEEE 485 shall be the principle for sizing the battery including temperature correction factor.	8.	Float Voltage	2.25 V/Cell	9.	End Cell Voltage	1.85 V/Cell	10.	No.of Cells/Battery bank	108
	Sl.No	Parameter description	Parameter value																																			
1.	DC System Voltage	220 V																																				
2.	Allowable Voltage Variation	+10% to -15%																																				
3.	Design margin	<u>10%</u>																																				
4.	Aging factor	<u>1</u>																																				
5.	Cable voltage drop to be considered for Battery Sizing	<u>6.6V</u>																																				
6.	Min. Electrolytic temp	<u>4 deg c</u>																																				
7.	Temperature correction factors	IEEE 485 shall be the principle for sizing the battery including temperature correction factor.																																				
8.	Float Voltage	2.25 V/Cell																																				
9.	End Cell Voltage	1.85 V/Cell																																				
10.	No.of Cells/Battery bank	108																																				
3. <u>ADDITIONAL REQUIREMENTS (PROJECT SPECIFIC)</u>																																						
<table border="1"> <tr> <th>Sl.No</th> <th>Description</th> <th>Requirements</th> </tr> <tr> <td>1.</td> <td>Terminal Posts</td> <td>The cell container and vent plugs, in addition will confirm to the safety requirements of UL 924 or equivalent safety standard.</td> </tr> <tr> <td>2.</td> <td colspan="2">At the take-off points for the purchaser's cable connection a suitable</td> </tr> </table>					Sl.No	Description	Requirements	1.	Terminal Posts	The cell container and vent plugs, in addition will confirm to the safety requirements of UL 924 or equivalent safety standard.	2.	At the take-off points for the purchaser's cable connection a suitable																										
Sl.No	Description	Requirements																																				
1.	Terminal Posts	The cell container and vent plugs, in addition will confirm to the safety requirements of UL 924 or equivalent safety standard.																																				
2.	At the take-off points for the purchaser's cable connection a suitable																																					
Ref. Doc																																						

TD- Rev No. 00 Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		ANNEXURE –A																																	
				Rev No.00																																	
				PAGE 6 of 14																																	
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company. <table border="1" style="width: 100%;"> <tr> <td style="width: 5%;"></td> <td style="width: 5%;">arrangement will be made to suit termination of purchaser's cables. The termination points will be shrouded with transparent covers in order to avoid any accidental contact.</td> </tr> <tr> <td>3.</td> <td>Manufacturer will demonstrate the performance of the battery at the specified duty cycle, at the specified min. ambient temperature during pre-dispatch inspection, by conducting test on a randomly selected cell, if requested.</td> </tr> </table> 3.1 ADDITIONAL ACCESSORIES <u>(Accessories in addition to the items specified at Cl.No. 5.1 of main Battery specification (PY-55027))</u> <table border="1" style="width: 100%;"> <thead> <tr> <th>Sl.No</th> <th>Description</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>PVC spill trays under the battery cells for entire battery bank</td> <td>One set for each battery bank</td> </tr> <tr> <td>2.</td> <td>Stand & cell Insulators (Polypropylene/PVC channel for Mild steel stand, Porcelain for teak wood stand) (As required for complete battery with 5% extra) [Cl.No. 5.1 6 of PY55027]– 1 set of quantity</td> <td>Not applicable to present enquiry since Battery stand is not applicable. However all the hard ware (if required) required for fixing the Battery cells to concrete structure shall be supplied by vendor.</td> </tr> <tr> <td>3.</td> <td>Thermometers mentioned at Cl.No. 5.1 10 (c) of PY55027 shall be pocket type with other requirements unchanged.</td> <td></td> </tr> <tr> <td>4.</td> <td>Cell lifting facility (cell lifting straps) at Cl.No. 5.1 10 (n) of PY55027 - 2 Nos total shall be supplied.</td> <td></td> </tr> </tbody> </table> 4. DOCUMENTATION 4.1 Documents to be submitted along with offer <table border="1" style="width: 100%;"> <thead> <tr> <th>Sl.No.</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Completely filled in technical datasheet-1(As specified in Annexure-A above)</td> </tr> <tr> <td>2.</td> <td>Type test Reports (as per Cl.No. 1 (21) of Annexure-A above)</td> </tr> <tr> <td>3.</td> <td>Battery sizing calculation with respect to load duty cycle (Annexure-A) to be provided along with supporting documents (capability / discharge curve, temperature correction factor, float charging factor & published technical catalogue) for considered factors.</td> </tr> <tr> <td>4.</td> <td>GA drawing and foundation details of battery stand including ventilation requirements (for information only)</td> </tr> <tr> <td>5.</td> <td>“Check list” with bidder’s signature and company stamp.</td> </tr> <tr> <td>6.</td> <td>“Deviation Schedule” with bidder’s signature and company stamp.</td> </tr> </tbody> </table>						arrangement will be made to suit termination of purchaser's cables. The termination points will be shrouded with transparent covers in order to avoid any accidental contact.	3.	Manufacturer will demonstrate the performance of the battery at the specified duty cycle, at the specified min. ambient temperature during pre-dispatch inspection, by conducting test on a randomly selected cell, if requested.	Sl.No	Description	Quantity	1.	PVC spill trays under the battery cells for entire battery bank	One set for each battery bank	2.	Stand & cell Insulators (Polypropylene/PVC channel for Mild steel stand, Porcelain for teak wood stand) (As required for complete battery with 5% extra) [Cl.No. 5.1 6 of PY55027]– 1 set of quantity	Not applicable to present enquiry since Battery stand is not applicable. However all the hard ware (if required) required for fixing the Battery cells to concrete structure shall be supplied by vendor.	3.	Thermometers mentioned at Cl.No. 5.1 10 (c) of PY55027 shall be pocket type with other requirements unchanged.		4.	Cell lifting facility (cell lifting straps) at Cl.No. 5.1 10 (n) of PY55027 - 2 Nos total shall be supplied.		Sl.No.	Description	1.	Completely filled in technical datasheet-1(As specified in Annexure-A above)	2.	Type test Reports (as per Cl.No. 1 (21) of Annexure-A above)	3.	Battery sizing calculation with respect to load duty cycle (Annexure-A) to be provided along with supporting documents (capability / discharge curve, temperature correction factor, float charging factor & published technical catalogue) for considered factors.	4.	GA drawing and foundation details of battery stand including ventilation requirements (for information only)	5.	“Check list” with bidder’s signature and company stamp.	6.	“Deviation Schedule” with bidder’s signature and company stamp.
	arrangement will be made to suit termination of purchaser's cables. The termination points will be shrouded with transparent covers in order to avoid any accidental contact.																																				
3.	Manufacturer will demonstrate the performance of the battery at the specified duty cycle, at the specified min. ambient temperature during pre-dispatch inspection, by conducting test on a randomly selected cell, if requested.																																				
Sl.No	Description	Quantity																																			
1.	PVC spill trays under the battery cells for entire battery bank	One set for each battery bank																																			
2.	Stand & cell Insulators (Polypropylene/PVC channel for Mild steel stand, Porcelain for teak wood stand) (As required for complete battery with 5% extra) [Cl.No. 5.1 6 of PY55027]– 1 set of quantity	Not applicable to present enquiry since Battery stand is not applicable. However all the hard ware (if required) required for fixing the Battery cells to concrete structure shall be supplied by vendor.																																			
3.	Thermometers mentioned at Cl.No. 5.1 10 (c) of PY55027 shall be pocket type with other requirements unchanged.																																				
4.	Cell lifting facility (cell lifting straps) at Cl.No. 5.1 10 (n) of PY55027 - 2 Nos total shall be supplied.																																				
Sl.No.	Description																																				
1.	Completely filled in technical datasheet-1(As specified in Annexure-A above)																																				
2.	Type test Reports (as per Cl.No. 1 (21) of Annexure-A above)																																				
3.	Battery sizing calculation with respect to load duty cycle (Annexure-A) to be provided along with supporting documents (capability / discharge curve, temperature correction factor, float charging factor & published technical catalogue) for considered factors.																																				
4.	GA drawing and foundation details of battery stand including ventilation requirements (for information only)																																				
5.	“Check list” with bidder’s signature and company stamp.																																				
6.	“Deviation Schedule” with bidder’s signature and company stamp.																																				
Ref. Doc																																					

TD- Rev No. 00	Form No.		PRODUCT STANDARD		ANNEXURE –A																																																																
			PROJECT ENGINEERING & SYSTEMS DIVISION		Rev No.00																																																																
			HYDERABAD		PAGE 7 of 14																																																																
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company. <table border="1" style="width: 100%;"> <tr> <td style="width: 5%;">7.</td> <td>Unpriced Price Schedule (Annexure-A) as enclosed with NIT with “Quoted” word against items with bidder’s signature and company stamp.</td> </tr> <tr> <td>8.</td> <td>Pre bid query format (Annexure-B)</td> </tr> </table> 4.2 Documents to be submitted after award of contract for review and approvals <table border="1" style="width: 100%;"> <thead> <tr> <th>Sl.no</th> <th>Document</th> <th>Category</th> <th>Submission Schedule</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Completely filled in technical datasheets</td> <td>A</td> <td>Within 1 week from PO</td> </tr> <tr> <td>2.</td> <td>Battery sizing calculation (Including battery catalogues, curves etc.) (as per IEEE-485 or Equivalent Standard)</td> <td>A</td> <td>Within 1 week from PO</td> </tr> <tr> <td>3.</td> <td>Fault calculation & Connector sizing calculation</td> <td>A</td> <td>Within 1 week from PO</td> </tr> <tr> <td>4.</td> <td>Dimensional drawings of the battery and space requirement for the battery room (**)</td> <td>A</td> <td>Within 1 week from PO</td> </tr> <tr> <td>5.</td> <td>GA drawing and foundation details of battery stand (**)</td> <td>A</td> <td>Within 1 week from PO</td> </tr> <tr> <td>6.</td> <td>Bill of Material for the battery</td> <td>A</td> <td>Within 1 week from PO</td> </tr> <tr> <td>7.</td> <td>List of Mandatory Spares for battery</td> <td>I</td> <td>Within 1 week from PO</td> </tr> <tr> <td>8.</td> <td>O & M manual for battery</td> <td>A</td> <td>Within 1 week from PO</td> </tr> <tr> <td>9.</td> <td>Field Quality Plan for battery</td> <td>I</td> <td>1 week after inspection</td> </tr> <tr> <td>10.</td> <td>Type test reports for the battery</td> <td>A</td> <td>Within 1 week from PO</td> </tr> <tr> <td>11.</td> <td>Cable Termination arrangement for battery terminal</td> <td>A</td> <td>Within 1 week from PO</td> </tr> <tr> <td>12.</td> <td>Quality Plan for battery</td> <td>A</td> <td>Within 1 week from PO</td> </tr> <tr> <td>13.</td> <td>Battery room lay out (**)</td> <td>A</td> <td>Within 1 week from PO</td> </tr> <tr> <td>14.</td> <td>Ventilation requirements of Battery room (Necessary sizing calculation shall be furnished)</td> <td>I</td> <td>Within 1 week from PO</td> </tr> </tbody> </table>						7.	Unpriced Price Schedule (Annexure-A) as enclosed with NIT with “Quoted” word against items with bidder’s signature and company stamp.	8.	Pre bid query format (Annexure-B)	Sl.no	Document	Category	Submission Schedule	1.	Completely filled in technical datasheets	A	Within 1 week from PO	2.	Battery sizing calculation (Including battery catalogues, curves etc.) (as per IEEE-485 or Equivalent Standard)	A	Within 1 week from PO	3.	Fault calculation & Connector sizing calculation	A	Within 1 week from PO	4.	Dimensional drawings of the battery and space requirement for the battery room (**)	A	Within 1 week from PO	5.	GA drawing and foundation details of battery stand (**)	A	Within 1 week from PO	6.	Bill of Material for the battery	A	Within 1 week from PO	7.	List of Mandatory Spares for battery	I	Within 1 week from PO	8.	O & M manual for battery	A	Within 1 week from PO	9.	Field Quality Plan for battery	I	1 week after inspection	10.	Type test reports for the battery	A	Within 1 week from PO	11.	Cable Termination arrangement for battery terminal	A	Within 1 week from PO	12.	Quality Plan for battery	A	Within 1 week from PO	13.	Battery room lay out (**)	A	Within 1 week from PO	14.	Ventilation requirements of Battery room (Necessary sizing calculation shall be furnished)	I	Within 1 week from PO
7.	Unpriced Price Schedule (Annexure-A) as enclosed with NIT with “Quoted” word against items with bidder’s signature and company stamp.																																																																				
8.	Pre bid query format (Annexure-B)																																																																				
Sl.no	Document	Category	Submission Schedule																																																																		
1.	Completely filled in technical datasheets	A	Within 1 week from PO																																																																		
2.	Battery sizing calculation (Including battery catalogues, curves etc.) (as per IEEE-485 or Equivalent Standard)	A	Within 1 week from PO																																																																		
3.	Fault calculation & Connector sizing calculation	A	Within 1 week from PO																																																																		
4.	Dimensional drawings of the battery and space requirement for the battery room (**)	A	Within 1 week from PO																																																																		
5.	GA drawing and foundation details of battery stand (**)	A	Within 1 week from PO																																																																		
6.	Bill of Material for the battery	A	Within 1 week from PO																																																																		
7.	List of Mandatory Spares for battery	I	Within 1 week from PO																																																																		
8.	O & M manual for battery	A	Within 1 week from PO																																																																		
9.	Field Quality Plan for battery	I	1 week after inspection																																																																		
10.	Type test reports for the battery	A	Within 1 week from PO																																																																		
11.	Cable Termination arrangement for battery terminal	A	Within 1 week from PO																																																																		
12.	Quality Plan for battery	A	Within 1 week from PO																																																																		
13.	Battery room lay out (**)	A	Within 1 week from PO																																																																		
14.	Ventilation requirements of Battery room (Necessary sizing calculation shall be furnished)	I	Within 1 week from PO																																																																		
Ref. Doc	A: Approval I: Information R: Review																																																																				

TD- Rev No. 00	Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		ANNEXURE –A Rev No.00 PAGE 8 of 14																																
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		Note: 1) BHEL will furnish Comments within 1 week from receipt of the Drawings. 2) Vendor to submit revised drawings/documents within 1 week from BHEL's comments date.																																			
		4.3 <u>Instruction manuals</u>																																			
		a) Instruction manuals for the installation, operation and maintenance of battery to be supplied shall be at least two months before the date of dispatch of equipment.																																			
		b) The installation & maintenance manual of battery shall contain the following.																																			
		<table border="1"> <thead> <tr> <th>Sl.No.</th> <th>Description</th> </tr> </thead> <tbody> <tr><td>1.</td><td>General description giving type and rating of various batteries</td></tr> <tr><td>2.</td><td>Technical data</td></tr> <tr><td>3.</td><td>Salient constructional details</td></tr> <tr><td>4.</td><td>Instruction to be followed on receipt at site</td></tr> <tr><td>5.</td><td>Instructions for foundations, if any</td></tr> <tr><td>6.</td><td>Erection procedures and checks</td></tr> <tr><td>7.</td><td>Procedure for filling electrolyte</td></tr> <tr><td>8.</td><td>Commissioning procedures and site tests</td></tr> <tr><td>9.</td><td>Routine, periodic and preventive inspection and maintenance procedures</td></tr> <tr><td>10.</td><td>Safety rules</td></tr> <tr><td>11.</td><td>Possible faults, their causes and remedies</td></tr> <tr><td>12.</td><td>Copies of Type, acceptance and routine test certificates in bound volume</td></tr> <tr><td>13.</td><td>Catalogues, literatures and drawings</td></tr> <tr><td>14.</td><td>Outline dimension drawings showing constructional features, relevant cross sectional views and earthing details, operator oriented description of equipment and accessories.</td></tr> <tr><td>15.</td><td>Operating procedures, maintenance procedures & precautions to be taken during operation and maintenance work.</td></tr> </tbody> </table>				Sl.No.	Description	1.	General description giving type and rating of various batteries	2.	Technical data	3.	Salient constructional details	4.	Instruction to be followed on receipt at site	5.	Instructions for foundations, if any	6.	Erection procedures and checks	7.	Procedure for filling electrolyte	8.	Commissioning procedures and site tests	9.	Routine, periodic and preventive inspection and maintenance procedures	10.	Safety rules	11.	Possible faults, their causes and remedies	12.	Copies of Type, acceptance and routine test certificates in bound volume	13.	Catalogues, literatures and drawings	14.	Outline dimension drawings showing constructional features, relevant cross sectional views and earthing details, operator oriented description of equipment and accessories.	15.	Operating procedures, maintenance procedures & precautions to be taken during operation and maintenance work.
		Sl.No.	Description																																		
		1.	General description giving type and rating of various batteries																																		
		2.	Technical data																																		
		3.	Salient constructional details																																		
		4.	Instruction to be followed on receipt at site																																		
5.	Instructions for foundations, if any																																				
6.	Erection procedures and checks																																				
7.	Procedure for filling electrolyte																																				
8.	Commissioning procedures and site tests																																				
9.	Routine, periodic and preventive inspection and maintenance procedures																																				
10.	Safety rules																																				
11.	Possible faults, their causes and remedies																																				
12.	Copies of Type, acceptance and routine test certificates in bound volume																																				
13.	Catalogues, literatures and drawings																																				
14.	Outline dimension drawings showing constructional features, relevant cross sectional views and earthing details, operator oriented description of equipment and accessories.																																				
15.	Operating procedures, maintenance procedures & precautions to be taken during operation and maintenance work.																																				
4.4 No.of prints to be submitted by manufacturer after award of contract.																																					
<table border="1"> <thead> <tr> <th>Sl.No.</th> <th>Description</th> <th>No.of copies</th> <th>No. of CD-ROMs</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>First submission/subsequent submission</td> <td>Soft copy in PDF format</td> <td></td> <td></td> </tr> <tr> <td>2.</td> <td>Final approved drgs. /docs. for distribution</td> <td>10 copies</td> <td>2 CD-ROMs</td> <td></td> </tr> <tr> <td>3.</td> <td>Operation & Maintenance manual</td> <td>Soft copy in PDF format</td> <td></td> <td></td> </tr> <tr> <td>4.</td> <td>Approved Operation &</td> <td>10 copies</td> <td>4 CD-ROMs</td> <td></td> </tr> </tbody> </table>				Sl.No.	Description	No.of copies	No. of CD-ROMs	Remarks	1.	First submission/subsequent submission	Soft copy in PDF format			2.	Final approved drgs. /docs. for distribution	10 copies	2 CD-ROMs		3.	Operation & Maintenance manual	Soft copy in PDF format			4.	Approved Operation &	10 copies	4 CD-ROMs										
Sl.No.	Description	No.of copies	No. of CD-ROMs	Remarks																																	
1.	First submission/subsequent submission	Soft copy in PDF format																																			
2.	Final approved drgs. /docs. for distribution	10 copies	2 CD-ROMs																																		
3.	Operation & Maintenance manual	Soft copy in PDF format																																			
4.	Approved Operation &	10 copies	4 CD-ROMs																																		
Ref. Doc																																					

TD- Rev No. 00	Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		ANNEXURE –A											
					Rev No.00											
					PAGE 9 of 14											
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		<table border="1"> <tr> <td></td> <td>Maintenance manual (*)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5.</td> <td>Type test certificates</td> <td>10 copies</td> <td>4 CD-ROMs</td> <td></td> </tr> </table>						Maintenance manual (*)				5.	Type test certificates	10 copies	4 CD-ROMs	
			Maintenance manual (*)													
5.	Type test certificates	10 copies	4 CD-ROMs													
(*) – No.of copies of O&M manuals mentioned above are minimum quantity to be submitted by manufacturer unless otherwise specified in Annexure-A. 5. <u>AS-BUILT DRAWINGS</u> 5.1 Though only supply of equipment is under manufacturer's scope, manufacturer may note that all as-built correction (as given by purchaser to manufacturer) shall have to be incorporated in the originals by the manufacturer and copies of the as-built corrected drawings / documents as per requirement shall be submitted by the manufacturer. 6. <u>MANDATORY SPARES</u> <table border="1"> <thead> <tr> <th>Sl.No</th> <th>Description</th> <th>Quantity</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Inter-connecting cell strips</td> <td>6 No's</td> </tr> <tr> <td>2.</td> <td>Vent plug and acid level indicator</td> <td>2 No's</td> </tr> <tr> <td>3.</td> <td>Teakwood cable clamps with hardware</td> <td>2 No's</td> </tr> </tbody> </table>					Sl.No	Description	Quantity	1.	Inter-connecting cell strips	6 No's	2.	Vent plug and acid level indicator	2 No's	3.	Teakwood cable clamps with hardware	2 No's
Sl.No	Description	Quantity														
1.	Inter-connecting cell strips	6 No's														
2.	Vent plug and acid level indicator	2 No's														
3.	Teakwood cable clamps with hardware	2 No's														
Ref. Doc																

TD- Rev No. 00	Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE –A Rev No.00 PAGE 10 of 14
-------------------	----------	--	--	--

COPYRIGHT AND CONFIDENTIAL

The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.

7. PRICE FORMAT

(TO BE FILLED BY VENDOR AND FURNISHED ALONG WITH OFFER)

PROJECT: _____

ENQUIRY NUMBER: _____

NAME OF BIDDER _____

ITEM: _____

OFFER REF NO. _____

Sl. No	Description	Unit	Qty	Unit Price	Total Value (Ex-works)	Remarks
I	Main Equipment					
1.	220V Lead Acid Battery sets including Commissioning spares, as per specification.	Set	2			
2.	Battery Accessories as per specification.	Set	2			
3.	Factory Acceptance Tests (FAT) at OEM's Works to be witnessed by Purchaser.	Set	1			
4.	Site Acceptance tests as per specification	Set	1			
II	Services for above main equipment					
1	Lump sum price for travel by Battery Package OEM to and from Site per visit. (1 Set = 1 Visit)	Set	1	Unit price Not Applicable		Quote Total Price (See Note-b & Note-c below)
2	Service charges for engineers: Lump sum price including Lodging, Boarding etc. for Battery Package OEM at site. (1 Set = 14 Days)	Set	1	Unit price Not Applicable		Quote Total Price (See Note-b & Note-c below)

Ref. Doc

- c. In case, e-Procurement System is followed for this bid, the Bidder shall quote the value obtained by adding Total Prices at Sl. No. II (1), II (2) against PR for Supervision of E&C of Battery Charger Package.
- d. Vendor to quote prices for the optional items at Sl.Nos. IV (1) above along with the main equipment. BHEL reserves the right to order along with main equipment or separately or not at all.

TD- Rev No. 00	Form No.		PRODUCT STANDARD	ANNEXURE –A
			PROJECT ENGINEERING & SYSTEMS DIVISION	Rev No.00
			HYDERABAD	PAGE 12 of 14
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		e. For Sl. No. IV (1) of above, bidder to provide list of 2 years recommended O&M spares along with unit price of each item. BHEL reserves the right to order full/partial quantity of the 2 years recommended O&M spares along with the main equipment or separately or not at all. The bidder will keep their prices valid till execution of order or till 18 months from the date of P.O, whichever is later. f. Mandatory Spares are optional for evaluation and ordering purpose i.e. tender may be evaluated with or without the price of mandatory spares and accordingly, mandatory spares may or may not be ordered. In any case, the bidder is required to quote the prices of Main equipment as well as Mandatory Spares. Bid evaluation will be done as per Grand Total (A) or Grand Total (B) of the table in price format. The choice of Grand Total (A) or Grand Total (B) will be informed to the bidder before price bid opening. g. Validity of all the above prices shall be kept firm till successful handing over of the equipment to end user. (Signature of the vendor)		
		Ref. Doc		

TD- Rev No. 00 Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD		ANNEXURE –A									
				Rev No.00									
				PAGE 13 of 14									
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		8. <u>DEVIATION SCHEDULE (TECHNICAL)</u>											
		<table border="1"> <thead> <tr> <th>Sl.No.</th> <th>Cl.No./Page No./Sec No.</th> <th>Description as specified</th> <th>Deviation taken</th> <th>Remarks/ Reason for Deviation</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>				Sl.No.	Cl.No./Page No./Sec No.	Description as specified	Deviation taken	Remarks/ Reason for Deviation			
Sl.No.	Cl.No./Page No./Sec No.	Description as specified	Deviation taken	Remarks/ Reason for Deviation									
NOTES: - Bidder may give a consolidated list of deviations in this form only. Only the deviations listed here in conjunction with the original tender, shall constitute the contract document for the award of the job to the Bidder. - Deviation listed elsewhere shall be ignored & will be summarily rejected. - If there are no deviations, bidder shall submit signed copy of this format, mentioning “No Deviations” & it shall be henceforth implied that Bidder is complying with all the clauses of the bidding document. - Attach more sheets in this format, if required. - Bidder may give a consolidated list of deviations in this form only. - Bidder shall state reason for the deviations in the remark column. - The Bidder confirms that all clauses of the Bidding document as are not listed above are fully complied by the Bidder.													
		(Signature of the Vendor)											
Ref. Doc													

TD- Rev No. 00	Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE –A Rev No.00 PAGE 14 of 14
-------------------	----------	--	--	--

COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED,
 It must not be used directly or indirectly in any way detrimental to the interest of the company.

9. CHECK LIST:

(TO BE FILLED BY BIDDER AND SUBMITTED ALONG WITH TECHNICAL OFFER)

Enquiry No. Date :
 Name of the Bidder :
 Project :
 Specification No : PY55027, Rev00
 Item : 220V Lead Acid Plante Battery

Sl. No.	Check point description	Supplier Confirmation (✓)
1.	Completely filled-in Technical Data sheet as per specification enclosed.	
2.	Battery sizing calculation with respect to load duty cycle (provided in Annexure-A) to be provided along with supporting documents (capability / discharge curve, temperature correction factor, float charging factor & published technical catalogue) for considered factors.	
3.	Duly signed Deviation Schedule(Technical) enclosed	
4.	Relevant Type Test Certificates enclosed	
5.	Unpriced Schedule(As per BHEL Format) enclosed as per BHEL specification complying to following: 1. Signed & Stamped 2. All items are quoted	
6.	Battery GA for information	
7.	List of commissioning spares	
8.	List of O&M spares (Recommended) for 2 years of plant operation (Unpriced) enclosed	
9.	Catalogues enclosed	
10.	Clause wise confirmation to BHEL specification included in technical offer except the deviations listed in deviation schedule.	
11.	Pre-Bid query format (Annexure-B)	

Note: Bidder to submit **this checklist** duly filled & signed along with the Offer. No deviation is acceptable in this regard. Without duly signed & stamped checklist, offer shall not be considered for evaluation.

BIDDER'S STAMP & SIGNATURE

