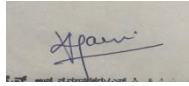


	PURCHASE SPECIFICATION Design, supply and erection of Pre-Engineered Building (PEB) rooms for 75MWp Solar PV Power Plant at GIPCL, Charanka Gujarat	PS-439-1198
		REV NO: 01
		PAGE : 1 OF 12

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Technical specification For Design, supply and erection of Pre-Engineered Building (PEB) rooms for 75MWp Solar Photovoltaic Power Plant at GIPCL, Charanka Gujrat
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Approved by : PRV 			
Revision details :R01 Changes are highlighted in yellow colour.	Prepared  VJ	Issued SCPV-ENG	Date 09-May-2018

	PURCHASE SPECIFICATION Design, supply and erection of Pre-Engineered Building (PEB) rooms for 75MWp Solar PV Power Plant at GIPCL, Charanka Gujarat	PS-439-1198
		REV NO: 01
		PAGE : 2 OF 12

1.0 Introduction

Bharat Heavy Electricals Limited (BHEL), Electronics Division, Bangalore is setting up 75MWp Grid-connected Solar PV Power Plant for GIPCL at Charanka, Gujrat. This technical specification describes the vendor scope of design, supply and erection of PEB-based rooms of the power plant (inverter rooms, security rooms, portable watchman cabins and toilets).

2.0 Location / approach particulars of the power plant:

75MW (AC) Solar Photovoltaic Power Plant,
Charanka Solar Park,
Patan district,
Gujarat.

3.0 Overview of solar PV power plant

The 75MWp solar photovoltaic power plant at Charanka comprises of an array of solar PV modules, power conditioning units, transformers, breakers etc. and power is exported to transmission grid. The various electrical panels such as inverters, 33kV vacuum circuit breakers (VCB), AC/DC distribution boards, UPS panels, SCADA panels etc. are housed in fifteen inverter rooms. These, fifteen inverter rooms are of PEB type for which foundation up to plinth level is of RCC structure and, above plinth, PEB steel structures/sheets are used for construction.

Each PEB inverter room is equivalent to 5MWp. Thus, all fifteen inverter rooms collectively generate 75MW. AC outputs from all these rooms are combined at Control room (completely RCC type) which is in BHEL scope of construction. The fifteen PEB inverter rooms are located at distributed locations within the power plant. In addition to the inverter rooms, the security rooms and watchman cabins are also of PEB type. Security rooms are located near the entrance gate and watchman cabins are at corner of the plant.

4.0 Vendor scope

#	Item Description	Quantity
4.1	Supply of PEB structural materials such as columns, rafters, beams, purlins, steel sheets, insulation, J-bolts etc. for inverter rooms as per clause 8.1. (Note: 1 set is for one inverter room)	15 set
4.2	Supply of PEB architectural items such as doors, windows, rolling shutters, etc. for inverter rooms as per clause 8.2. (Note: 1 set is for one inverter room)	15 set
4.3	Supply of PEB structural materials such as columns, rafters, beams, purlins, steel sheets, insulation, J-bolts etc. for security rooms as per clause 8.1. (Note: 1 set is for one security room)	2 set
4.4	Supply of PEB architectural items such as doors, windows, etc. for security rooms as per clause 8.2. (Note: 1 set is for one security room)	2 set
4.5	Supply of PEB structural materials such as columns, rafters, beams, purlins, steel sheets, insulation, J-bolts etc. for watchman cabins as per clause 8.1. (Note: 1 set is for one watchman cabin)	8 set
4.6	Supply of PEB architectural items such as doors, windows, etc. for watchman cabins as per clause 8.2. (Note: 1 set is for one watchman cabin)	8 set
4.7	Supply of PEB toilets including all fittings such as door, window, exhaust fan, wash basin, European water closet (EWC) etc. (Note: 1 set is for one toilet)	2 set

	PURCHASE SPECIFICATION Design, supply and erection of Pre-Engineered Building (PEB) rooms for 75MWp Solar PV Power Plant at GIPCL, Charanka Gujarat	PS-439-1198
		REV NO: 01
		PAGE : 3 OF 12

4.8	I&C: Erection of PEB inverter room structural materials as per clause 8.3 (Note: 1 AU represents one inverter room)	15 AU
4.9	I&C: Erection of PEB inverter room architectural items as per clause 8.4 (Note: 1 AU represents one inverter room)	15 AU
4.10	I&C: Erection of PEB security room structural materials as per clause 8.3 (Note: 1 AU represents one security room)	2 AU
4.11	I&C: Erection of PEB security room architectural items as per clause 8.4 (Note: 1 AU represents one security room)	2 AU
4.12	I&C: Erection of PEB watchman cabin structural materials as per clause 8.3 (Note: 1 AU represents one watchman cabin)	8 AU
4.13	I&C: Erection of PEB watchman cabin architectural items as per clause 8.4 (Note: 1 AU represents one watchman cabin)	8 AU
4.14	I&C: PEB toilet including all fitting like door, window, exhaust, washbasin, European water closet etc.	2 AU
4.15	Warranty Vendor shall provide warranty for 12 months for the supply and erection of PEB rooms from the date of completion of erection or 18 months from the date of completion of erection whichever is earlier.	-

5.0 BHEL scope

For the sake of clarity, BHEL scope (supply and I&C) of PEB inverter room / security room / watchman cabin is detailed as below:

- Complete civil foundation works for all the PEB inverter rooms, security rooms and watchman cabins.
- RCC cable trenches within all inverter rooms.
- Flooring works within all inverter rooms and security rooms
- Plinth protection around all inverter rooms and security room
- Steps/ ramps on front/back sides of the room as applicable.
- Plastering / painting work for civil portions
- Complete electrical works including supply and I&C of wiring, room appliances (lights, ceiling fans, exhaust fans, ventilators, etc.), switch boards, MCB boxes etc. for the fifteen inverter rooms and the security room.
Note: However, all the necessary cut-out/support provisions for mounting the exhaust fans and ventilators shall be in vendor scope.

6.0 Enclosures to this tender specification

6.1	Typical layout of PEB inverter room showing electrical panel placement (tender purpose only)
6.2	Typical layout of PEB security room (tender purpose only)
6.3	Typical layout of PEB watchman cabin (tender purpose only)
6.4	Typical layout of PEB toilet (tender purpose only)

Notes:

- Overall base area of PEB inverter rooms/ security room/ watchman cabin shall be as per the typical layout enclosed.
- Height of vertical column structure of PEB inverter room shall be minimum 3.6m above FFL.
- Height of vertical column structure of PEB security room shall be minimum 3.0m above FFL.
- Height of vertical column structure of PEB watchman cabin shall be minimum 2.4m above FFL.

	PURCHASE SPECIFICATION Design, supply and erection of Pre-Engineered Building (PEB) rooms for 75MWp Solar PV Power Plant at GIPCL, Charanka Gujarat	PS-439-1198
		REV NO: 01
		PAGE : 4 OF 12

7.0 Documents to be submitted along with offer

- 1) Details of company of the bidder with credentials.
- 2) Vendor has to enclose the deviation sheet clause wise separately in case any deviations are sought by the vendor. Absence of any deviation sheet shall be taken as compliance of BHEL specification in total without any deviation.

8.0 Technical specification – Design, supply and erection of PEB inverter rooms / PEB security rooms

8.1 Design and supply of PEB structural materials

- a) After receipt of BHEL PO, following documents shall be submitted to BHEL/GIPCL for approval:
 1. Structural design calculations including STADD.Pro analysis
 2. GA drawings along with BOM.
- b) Vendor shall supply the structural materials such as columns, rafters, beams, purlins, tie rods, sheets, wall cladding/roofing PUF insulation, hardware etc. to the site as per the BHEL/GIPCL approved drawings. Raw materials for steel sections, sheets etc. shall be of reputed make such as Jindal, RINL, SAIL, Tata steel etc. Vendor shall take prior approval from BHEL for the make prior to proceeding with procurement action.
- c) Vendor shall also supply the J bolts/nuts/washers, alignment plates and other related hardware that are used for positioning and anchoring of the PEB structures to the RCC foundation plinth.
- d) Relevant clauses of “**Detailed specification of PEB inverter room / PEB security room**” section shall be adopted.

8.2 Design and supply of PEB architectural items

- a) After receipt of BHEL PO, vendor shall submit GA drawings along with BOM (item-wise description, quantity, make, model etc) of the architectural items for BHEL/GIPCL approval.
- b) The architectural items submitted for approval shall meet the requirements of various aspects of the room such as electrical, illumination, ventilation, exhaust, thermal, safety, security etc.
- c) Accordingly, this shall include all items (except the electrical wiring and appliances as listed under BHEL scope) such as windows with shades, doors with shades/lock/key, rolling shutters with lock/key, ventilator provisions, exhaust provisions, rain water gutters/ downcomers/ pipes etc. Raw materials for steel sections, sheets etc shall be of reputed make such as Jindal, RINL, SAIL, Tata steel etc. Vendor shall take prior approval from BHEL for the make prior to proceeding with procurement action.
- d) Relevant clauses of “**Detailed specification of PEB inverter room / PEB security room**” section shall be adopted.

8.3 Erection of structural items of PEB inverter room / PEB security room:

- a) Vendor shall erect the structural items such as columns, rafters, beams, purlins, tie rods, sheets, wall cladding/roofing insulation, hardware etc. as per the BHEL/GIPCL approved drawings/BoM.
- b) Vendor shall also carry out necessary finishing activities such as painting etc.
- c) Vendor shall deploy qualified/competent team at site to carry out the above erection activity.
- d) Vendor shall also deploy their specialized team during plinth casting of J bolts / alignment (base) plates etc in order to provide the needed support/guidance to the BHEL civil construction team at site.
- e) All necessary labour, tools & tackles, shuttering materials, measuring instruments, machinery shall be in vendor scope of supply. This shall include spanner sets, drilling machines, welding machines, hydra, JCB, truck, trolley etc as required for the erection work.
- f) For the above, relevant clauses of “**Detailed specification of PEB inverter room / PEB security room**” section shall be adopted.

	PURCHASE SPECIFICATION Design, supply and erection of Pre-Engineered Building (PEB) rooms for 75MWp Solar PV Power Plant at GIPCL, Charanka Gujarat	PS-439-1198
		REV NO: 01
		PAGE : 5 OF 12

8.4 Erection of architectural items of PEB inverter room / PEB security room:

- Vendor shall carry out erection of the architectural items such as windows with shades, doors with shades/lock/key, rolling shutters with lock/key, structural provisions for ventilators / exhausts, rain water gutters/ downcomers/ pipes etc as per the BHEL/GIPCL approved drawings / BoM.
- Vendor shall also carry out necessary finishing activities such as painting etc.
- Vendor shall deploy qualified/competent team at site to carry out the above erection activities.
- All necessary labour, tools & tackles, shuttering materials, measuring instruments, machinery shall be in vendor scope of supply. This shall include spanner sets, drilling machines, welding machines, hydra, JCB, truck, trolley etc as required for the erection work.
- For the above, relevant clauses of “**Detailed specification of PEB inverter room/ PEB security room**” section of this specification shall be adopted.

9.0 Detailed specification of PEB inverter room / PEB security room:

9.1 PEB inverter room / security room

The Inverter room / Security room shall be made of Pre-Engineered Buildings (PEB). The PEB shall be made of structural steel construction with double skinned metal roofing and wall cladding of approved profile. It shall be designed, manufactured, supplied and erected by the bidder/PEB agency. PEB shall be complete with painting, metal fascia, metal gutter, rain water down comers, sun-shades, openings, etc., along with associated structural steel, cladding and roofing work insulation, Trims & Flashings. Each item of PEB like panels, masonry, plastering, flooring, foundation, fittings etc. shall be suitable or complete life of solar plant. The construction methodology for PEB shall also be submitted for BHEL/GIPCL approval before start of works.

The layout of Inverter room / Security room shall be designed so as to divert the heat generated from each inverter outside the room. The inverter room / security room shall be designed for a life of 25 years. The successful bidder shall have to get the structural design done as per the prevailing Indian standard codes and International Standard. **The structural design of PEB room of each type shall have to be submitted to BHEL/GIPCL for approval before actual starts of the work.**

The PEB shall have robust water tightness at all joints and connections. The building shall have a high class durability and performance during the adverse weather conditions.

9.2 Structure and material specification

The PEB inverter room / security room shall have a steel frame primary structural members. Primary members fabricated from plates shall conform to IS2062 min Grade E250 Quality BR/ ASTM A572-12 Grade 50 with minimum yield strength of 345 MPa. Steel shall be semi-killed/killed. Minimum thickness of steel plates shall be 4 mm. Hot rolled primary structural members and Rod/Angle bracing shall conform to IS2062 Grade E250 Quality A. Secondary members for Purlins and Girts shall conform to the specification of IS 811 or ASTM A1003-12 made from steel sheets conforming to ASTM A1011-12b Grade 50 having a minimum yield strength of 345 MPa. The minimum thickness of secondary members shall be 3.15 mm. All other miscellaneous secondary members shall have minimum yield strength of 250 MPa.

Insulated wall cladding or roofing shall consist of double skin metal cladding with Poly Urethane Foam (PUF) i.e. sandwich type. The panels shall be made out with minimum 0.35mm thick pre coated steel sheet on both side of Poly Urethane Foam (PUF) for both wall and roof. PUF must be made of continuous method PU foam and must be CFC free, self-extinguishing, fire retardant type with density 40+/-2 kg/m³ and thermal conductivity 0.019-2.2 W/(m²K) at 10°C. The PUF panels shall be a factory made item ready for installation at site.

	PURCHASE SPECIFICATION Design, supply and erection of Pre-Engineered Building (PEB) rooms for 75MWp Solar PV Power Plant at GIPCL, Charanka Gujarat	PS-439-1198
		REV NO: 01
		PAGE : 6 OF 12

9.3 Fasteners & Connections:

Special coated self-drilling screws/fastener shall be used conforming to class 3 as per AS: 3566.1 and AS: 3566.2. Steel bolts, nuts and washers complying with AS 1112:2000. High Strength Bolts for Primary Connections IS: 1367 (Part III) Gr. 8.8 / ASTM A325. Bolts for Secondary Connection IS: 1367 (Part III) Gr. 4.6 / ASTM A307. HDG 8.8 grade Anchor/foundation Bolts shall be supplied by vendor and shall conform to IS: 5624 and relevant IS code.

9.4 Roof and Wall cladding:

PUF panels shall be made of troughed permanently colour coated metal sheets of steel for roofing and side cladding (internal and external) shall conform to the requirements of Table-1 and IS: 513 for Hot-dip Zinc coated or Al/Zn coated sheets. The insulation material thickness and details shall be as specified at relevant para in the specification.

PUF insulated panels Metal Sheet for Roofing and side cladding consist of external sheet as troughed permanently colour coated sheet & internal sheet as plain permanently colour coated sheet. Chemical composition of Troughed permanently colour metal sheet for roofing and side cladding shall conform to the provisions of same reference code to which the mechanical properties conform to. Roof panel shall be extended 300mm from the eaves wall and 150mm from Gable walls.

Plain permanently colour coated steel metal sheet for ridge and hips, flashing, trimming, closure for vertical and horizontal joints, capping etc. shall conform to the same requirements as those of troughed permanently colour coated metal sheet for roof and side cladding.

The maximum spacing of the fastener shall be 390 mm c/c along the length of purlins / runners. However exact spacing shall be as per the design done by the bidder of the fastener considering the wind load, self-load and other associated load. Minimum diameter of the fastener shall be 5.5 mm and at least 3 nos. of fastener shall be used per sheet. Fillers blocks as a trough filler shall be used to seal cavities formed between the profiled sheet and the support or flashing. The fillers blocks shall be manufactured from black synthetic rubber or any other material approved by engineer.

9.5 Roof Insulation and type:

Both metal sheets shall have an under insulation of minimum 70 mm thick PUF with density 40 ± 2 kg/m³ and thermal conductivity 0.019-2.2 W/(m°K) at 10°C with gutters and down take pipes along with Flashing & Top cap of required size and colour complete with all necessary hardware complete. Roof shall be projected at-least 300 mm from the wall. Stiffening ribs / subtle fluting for effective water shedding and special male/female ends with full return legs on side laps for purlin support and anti-capillary flute in side lap. Both upper and lower sheets shall be separated through spacers and fastened through zinc /zinc-tin coated self-drilling screws. The fastener size shall be calculated as per the design or manufacturers recommendations.

9.6 Wall Insulation:

All voids of external and internal metal walls shall have an under insulation of minimum 60 mm thick PUF with density 40 ± 2 kg/m³ and thermal conductivity 0.019-2.2 W/(m°K) at 10°C with proper supports etc. as approved. Both the walls should be separated by spacers system made up of cold formed steel bars and fastened through zinc /zinc-tin coated self-drilling screws. The external wall of Inverter room / security room facing the transformer area shall be as per IS: 1646 - Code of practice for fire safety of buildings (general); electrical installations.

	PURCHASE SPECIFICATION Design, supply and erection of Pre-Engineered Building (PEB) rooms for 75MWp Solar PV Power Plant at GIPCL, Charanka Gujarat	PS-439-1198
		REV NO: 01
		PAGE : 7 OF 12

9.7 Doors Frames:

Door frames shall be of T-iron frame of mild steel Tee-sections as per DSR-2013 item no 10.13. All doors shall be provided necessary fittings like hinges, handles, mortice locks, tower bolts, stopper, hydraulic door closer, etc. of CP brass complete as per the approval of BHEL/GIPCL.

~~Black powder coated~~ Anodised aluminium section (20 micron) with doors shall be with extruded built up standard tubular sections (min 2 mm thick), appropriate Z sections and other sections of approved make conforming to IS: 733 and IS: 1285, fixed to Pre-Engineered structure including necessary filling up of gaps at junctions with required PVC/neoprene felt etc. including hinges / pivots and double action hydraulic floor spring of approved brand and manufacture IS: 6315 marked, lock, handle and all necessary fittings as detailed in tender drawing or submitted by bidder in shop drawing and approved by BHEL/GIPCL.

The door entrance shall include Mild Steel ~~single~~ double leaf door. The structural steel shall conform to IS: 7452 and IS: 2062. The holdfasts shall be made from steel flats (50 mm and 5 mm thick). The fixtures, fastenings and door latch are to be made with same materials.

9.8 Windows Frames:

~~Aluminium black powder coated section~~ anodized aluminium section (20 micron) with min. thickness 2 mm, frame shall be of 92x31 mm, minimum 16G thick as per approved design. ~~Tinted glass and aluminium grill shall be provided.~~ MS Grill with paint and float glass 5 (or) 5.5 thickness with sun film shall be provided.

9.9 Louvers Frames:

~~Aluminium black powder coated section~~ anodized aluminium section (20 micron) with min. thickness 2 mm, frame shall be of 92x31 mm, minimum 16G thick as per approved design. Four louvers per each inverter room of size approx. 900 mm X 600 mm with air filter materials shall be provided at appropriate locations for air inlet into the rooms. Exact locations shall be finalized during detailed engineering.

9.10 Ventilators:

~~Aluminium black powder coated section~~ anodized aluminium section (20 micron) with min. thickness 2 mm. Ventilator cutouts with MS grills shall be provided for fixing of exhaust fans in inverter rooms. Supply and fixing of exhaust fans will be in BHEL scope.

9.11 PCU Duct Openings:

Four PCU duct openings per inverter room shall be provided to throw out heat from PCU out of inverter room. Exact size and location of duct openings shall be as per PCU manufacturer recommendations and will be finalized during detailed engineering. Supply and installation of ducts shall be in BHEL scope.

All accessible ventilators and windows of all buildings shall be provided with min. ~~4mm thick~~ 5 or 5.5 mm float glass with sun film, ~~tinted~~ for preventing solar radiations. Suitable sunshades made out of approved colour sheet will be provided to all external windows and door. The minimum projection for the sunshades will be 450 mm and 300mm wider than the width of the opening.

9.12 Rolling shutter:

GI Rolling shutter (~~Hand operated~~) (Mechanically operated) of minimum size 3m X 3m shall be fabricated from 18 gauge steel and machine rolled with 75 mm rolling centres with effective bridge depth of 12 mm lath sections, interlocked with each other and ends locked with malleable cast iron clips to IS:2108 and shall be

	PURCHASE SPECIFICATION Design, supply and erection of Pre-Engineered Building (PEB) rooms for 75MWp Solar PV Power Plant at GIPCL, Charanka Gujarat	PS-439-1198
		REV NO: 01
		PAGE : 8 OF 12

designed to withstand a wind load without excessive deflection. Metal rolling shutters and rolling grills as IS: 6248.

9.13 Paint and Coating:

Steel shall be colour coated with total coating thickness of 25 microns (nominal) dry film thickness (DFT) comprising of silicon modified polyester (SMP with silicon content of 30% to 50 %) paint or Super Durable Polyester (XRW) paint of 20 microns (nominal) on one side (exposed face) on 5 micron (nominal) primer coat and 10 microns (nominal) SMP or Super Durable Polyester paint over 5 micron (nominal) primer coat on other side. SMP and polyester paints system shall conform to Product type 4 as per AS/ANZ 2728. The structural steel shall be hot-dipped galvanized, conform to IS: 4759 or relevant Indian standard. All structural steel shall be treated with two coats of red oxide and three coats of Oil paint (Asian Paints, Berger, and Durex).

9.14 Lighting:

Vendor shall ensure that the room is designed to utilize maximum natural light during the day. BHEL scope includes furnishing the room with electric lights to achieve average illumination level of 150 Lux.

9.15 Design Parameters and Design Loads:

- The structure shall be designed for loads and load combination as per Indian Standards (latest revisions) such as IS: 875, IS: 1893, IS: 800, IS: 456 etc.
- Dead Load: Self Weight of Structure including Purlins, Sheeting, Girts, Bracings, weight of turbo ventilators to be added as Dead load etc.
- Imposed Load (Live Loads) Live loads shall be as per IS - 875. For sloped roofs up to 10 deg. it shall be 0.75 KN/M².
- Wind Load: The basic wind speed of the site is taken as 180 km/hr. Design wind load co-efficient shall be as per IS: 875-III.
- Earthquake Load: All PEB structures shall be designed for Seismic forces. Vertical Deflection and Horizontal Sway Limits:
 - Limiting Deflection: The limiting permissible vertical deflection for structural steel members shall be as per IS 800 2007.
 - The limiting permissible horizontal deflection for as per IS 800 2007 code where 'h' is height of building at eaves.

9.16 Descriptions of PEB Structures:

Primary Members: Primary structural framing shall include the transverse rigid frames, columns, corner columns, end wall wind columns, beams, truss member, base plate.

Secondary Members: Secondary structural framing shall include the purlins, girts, eave struts, bracing, flange bracing, base angles, clips, flashings and other miscellaneous structural parts. Suitable wind bracings sag rods to be reckoned while designing the structure.

Sealant: Sealant used for cladding shall be butyl based, two parts poly sulphide or equivalent approved, non-staining material and be flexible enough not to interface with fit of the sheets.

Closures: Solid or closed cell closures matching the profiles of the panel shall be installed along the eaves, rake and other locations.

Flashing and Trim: Flashing and / or trim shall be furnished at the rake, corners, eaves, and framed openings and wherever necessary to provide weather tightness and finished appearance. Colour shall be matching with the colour of wall. Material shall be 26 gauge thick conforming to the physical specifications of sheeting.

	PURCHASE SPECIFICATION Design, supply and erection of Pre-Engineered Building (PEB) rooms for 75MWp Solar PV Power Plant at GIPCL, Charanka Gujarat	PS-439-1198
		REV NO: 01
		PAGE : 9 OF 12

Gutters and Downcomers: Gutters shall be fabricated out of same metal sheet. Material shall be same as that of sheeting. Down comers shall be of galvanized steel pipes or PVC designed to ensure proper roof drainage system.

Group	Grade/ Reference code	Yield strength (min) MPa	Tensile strength (min) MPa	Coating class designation	BMT (mm)	+ve tolerance (mm)	Upper limit of BMT	-ve tolerance (mm)	Lower limit of BMT (mm)
I	G250/ AS1397	250	320	Z275	0.6	0.04	0.64	-0.04	0.56
	SS255/ ASTM A653M	255	360						
	S250GD/ EN10326	250	330						
II	G350/ AS1397	350	420	AZ150	0.5	0.04	0.54	-0.04	0.46
	SS340 Class 4/ ASTM A792M	340	410						
	S350GD/ EN10326	350	420						

NOTE: Minimum elongation % shall be as per relevant Standard and Code.

All steel materials supplied by the Agency shall be in a sound condition, of recent manufacture, free from defects, loose mill scale, slag intrusions, laminations, pitting, flaky, rust, etc. and be of full weight and thickness specified.

10.0 General construction requirements

10.1 Structural Steel

All structural steel design shall be carried out as per IS 800. Structural steel shall conform to IS 2062, Pipe shall be as per medium/high grade of IS 1161, checkered plates shall conform to 3502 and Hollow steel sections for structural use shall conform to IS: 4923.

10.2 List of applicable Indian Standards

Indian codes, and/or standards shall govern, in all the cases wherever they are available. In case of a conflict between such codes and/or standards and the specifications, the stringent provisions shall govern. Such codes and/or standard referred to shall mean the latest revision, amendments/changes adopted and published by the relevant agencies. In case of any further conflict in this matter the same shall be referred to the Engineer-in-charge, whose decision shall be final and binding.

	PURCHASE SPECIFICATION Design, supply and erection of Pre-Engineered Building (PEB) rooms for 75MWp Solar PV Power Plant at GIPCL, Charanka Gujarat	PS-439-1198
		REV NO: 01
		PAGE : 10 OF 12

Other internationally acceptable standards shall be accepted, only if, no Indian Standards are existing. However, other standards also will be accepted if the Contractor establishes that the works are meeting the requirements of Indian Standards also. A brief list of Indian Standards applicable to these works is as below:

General

IS: 875-I	Code of Practice for Design Dead Loads for Building and Structures
IS: 875-II	Code of Practice for Design Imposed Loads for Building and Structures
IS: 875-III	Code of practice for design loads (other than earthquake) for buildings and structures.
IS: 1893	Criteria for earthquake resistant design of structures.
IS: 4326	Code of Practice for earthquake resistant design and construction of buildings

Steel structures

IS:800	Code of practice for use of structural steel in general building construction
IS:801	Code of practice for use of cold-formed light gauge steel structure members
IS:802	Code of practice for use of structural steel in overhead transmission line towers
IS:806	Code of practice for use of steel tubes in general building construction
IS:808	Dimensions for hot rolled steel beam, column channel and angle section
IS:811	Specification for cold formed light gauge structural steel sections
IS:813	Scheme of symbols for welding
IS:1079	Hot rolled carbon steel sheet and strip – specification
IS:2062	Hot rolled medium and high tensile structural steel – specification
IS:4923	Hollow steel sections for structural use.
IS:1161	Steel tubes for structural purpose
IS:2721	Galvanized steel chain link fence fabric – specification

Painting and coating

IS:4736	Hot dip zinc coatings on mild steel tubes
IS:4759	Hot dip zinc coatings on structural steel and other allied products – specification
IS:1868	Anodic coatings on aluminium and its alloys
IS:2395-I	Paintings of concrete, Masonry and plaster surfaces – code of operations and workmanship
IS:2395-II	Code of practice for painting concrete, masonry and plaster surfaces: schedule
IS:1477-I	Code of practice for painting of ferrous metals in buildings: pre-treatment
IS:1477-II	Code of practice for painting of ferrous metals in buildings: painting

Miscellaneous

IS:19805	Code of practice for structural use of un-reinforced masonry
IS:3067	Code of practice for general design details and preparatory works for damp/water proofing
SP:6	Handbook for structural engineers (all parts)

	PURCHASE SPECIFICATION Design, supply and erection of Pre-Engineered Building (PEB) rooms for 75MWp Solar PV Power Plant at GIPCL, Charanka Gujarat	PS-439-1198
		REV NO: 01
		PAGE : 11 OF 12

SP:7	National Building Code of India
SP:16	Design Aids for reinforced concrete to IS:456
SP:20	Handbook on masonry design and construction
SP:22	Explanatory handbook on codes for earthquake engineering
SP:24	Explanatory handbook on Indian Standard Code of Practice for plain and reinforced concrete
SP:25	Handbook on causes and prevention of cracks in buildings
SP:32	Handbook on functional requirements of industrial buildings
SP:34	Handbook of concrete reinforcement & detailing

11.0 General conditions applicable during supply, installation and commissioning phase

11.1	Vendor shall organize construction power supply on their own. Accordingly, if required, DG sets of suitable capacity shall be deployed by the vendor for construction works.
11.2	Similarly, water required for construction works shall be organized by vendor. Vendor shall organize bore wells at the site if required. In case bore well is not successful, vendor shall make their own alternate arrangements (water tankers etc).
11.3	All machinery such as cranes, hydra, JCBs, forklifts, transport trucks, trolleys, concrete mixers, Ajax machines etc necessary for movement and installation of materials shall be organized by the vendor.
11.4	All necessary tools and tackles such as screw driver set, power screw drivers, cutting pliers, nose pliers, spanner sets, adjustable spanners, hole saw cutter set, bending tools, torque wrenches, hack saw blades, pipe wrenches, flat / round files, drilling machines, welding machines, steel bar bending tools / templates for RCC works, spade, shovel, hammer etc shall be organized by the vendor.
11.5	All necessary measuring instruments such as measuring tapes, spirit levels etc. shall be organized by the vendor.
11.6	Vendor shall make their own arrangements for necessary food, drinking water and accommodation for their labour and employees posted at the site. Similarly, food and drinking water required at the site, during the construction operations, shall also be in scope of vendor.
11.7	Vendor shall organize all necessary steps to meet statutory requirements such as labour license, PF, ESI, insurance etc. and also ensure compliance with relevant acts such as minimum wages act, income tax act, employee insurance act, BOCW act etc. for their labour deployed at site.
11.8	Vendor shall organize activities such as receipt of all supply items of PEB rooms at site, unloading from the trucks, safe storage at site, movement from storage location to point of construction etc. Vendor shall deploy their own security watch and ward to safeguard their supply items from pilferage. Insurance for the supplied items until the completion of erection of all the PEB rooms shall be the responsibility of vendor.
11.9	Vendor shall maintain updated labour register, with name, age, qualification, salary, attendance details etc at the site.
11.10	Vendor shall use danger boards, wherever required, to ensure safety of the persons during the work at site.
11.11	Vendor shall adhere to all necessary safety norms such as use of helmet, goggles, hand gloves, gumboots, aprons etc. It is the ultimate responsibility of the vendor in all respect to prevent accidents at the site and safeguard their labour from accidents.
11.12	Vendor shall, at the completion of every work, clear off the debris, which resulted out of their work.
11.13	Vendor shall carry out the work without causing inconvenience to other contract groups at the site. In case of conflicts with other groups, vendor shall ensure that the matter is resolved at once amicably so

	PURCHASE SPECIFICATION Design, supply and erection of Pre-Engineered Building (PEB) rooms for 75MWp Solar PV Power Plant at GIPCL, Charanka Gujarat	PS-439-1198
		REV NO: 01
		PAGE : 12 OF 12

	that the progress of work is not affected.
11.14	Any damages on the other buildings, structures etc. of the site, if attributable to the acts of labour / employees of vendor, shall be rectified and made good by the vendor at their own cost.
11.15	No child labour shall be employed for execution of the present contract.
11.16	Any miscellaneous materials, which are found essential for technical completion of the contract but not mentioned explicitly in this specification, shall be deemed to be included in the specification. Accordingly, such materials shall be included by the vendor as part of the offer.
11.17	BHEL / GIPCL shall witness routine / acceptance tests performed at manufacturer works for the items supplied by vendor. Vendor shall accordingly provide inspection call to BHEL with submission of quality assurance plan in advance. For the items bought out from dealers, test certificates, as per relevant IS / IEC standards, as issued by manufacturer shall be submitted to BHEL. However, prior approval shall be obtained from BHEL/GIPCL for procurement of the item from dealers.
11.18	Field Quality Plan / Quality control system: Vendor shall make arrangements for testing of all construction materials in accordance with FQP (Field quality control plan) as approved by BHEL/GIPCL. If required for this purpose, an exclusive testing laboratory shall be established at site. Vendor shall deploy a well experienced quality control engineer to monitor all QC activities at site as per approved FQP.
11.19	Any deviations during construction shall be discussed with BHEL / GIPCL site engineers and implementation shall be taken up only after approval from BHEL / GIPCL.
11.20	Vendor shall submit periodic status report, on daily as well as weekly consolidated basis, to BHEL on the progress of the contract.