Technical Compliance Form – Tender No. IPR/TN/PUR/TPT/ET/20-21/5 Dated 22/6/2020

Sr. No.	Parameters	Technical Specification of IPR	Technical Specification of Vendor
1	Inputs	3 phase, 415V, 50Hz, +/- 10%	
2	Output a) Open circuit voltage b) Full load voltage c) Full load current d) Resolution e) Source type	 300V DC 125V DC 800 A (Current should be adjustable from 100A to 800A with resolution of 1A) 1 A Constant current (Independent of the load voltage)	
3	Interlocks a) Cooling water temperature (If water cooling is used) b) Water flow c) Stack temperature d) Over voltage e) Over current f) Single phasing g) Emergency Off h) Panel door	 All Sensors NO/NC input will be provided by IPR for interlock purpose except overvoltage, over current, single phasing, emergency off and panel door interlocks. The vendor should demonstration the functioning of these interlocks using dummy inputs of 0 to 5 V. Vendor should also provide a 5V TTL for external communications. This includes all analog controls of power supply for example current setting. The interlocks operation should be implemented using PLC and HMI.	
4	Meters & display a) Input Voltage b) Input Current c) Output Voltage d) Output Current e) Water Temperature f) Digital Multifunction Energy Meter g) Stack temperature	 The display of input voltage, input current, output voltage, output current, heat sink temperature should be implemented using HMI. In case of water based cooling incorporations, the input and output water temperature of the manifold should be displayed on HMI along with water flow rate. The kW, kVA, PF, V, I readings should be displayed on a separate energy meter.	

5	Indications a) R, Y, B indications b) All interlocks status c) Mains ON d) Power supply ON/OFF e) All switches ON/OFF indications	All the indicators should be of reputed company and CE certified. Indications can be displayed through HMI.	
6	Switches a) Push button On b) Push button Off c) Emergency Off	The on/off provision should also be done through external control through 5V TTL except emergency switches. Other On/Off should be controlled through PLC and HMI.	
7	Current setting pot	The output operating DC current setting should be done through HMI. The current setting should also be possible through external control using analog signal of 0-10V.	
8	Grounding	The positive output terminal should be grounded along with the panel body. There should be two output positive bus-bars for two positive cables each of 800A rating and one bus-bar for negative cable of 800A rating.	
9	External control	All external interlocks should be provided through 0-5V digital inputs. The external current control should be provided through 0-10V analog inputs.	
10	Input and Output cable	■ Flexible copper conductor. ■ Both input and output cables should be of 10 meter length each and should be of appropriate ratings as per the suitable IS standards for power cables to carry 800A current in each output cables. ■ There are two positive cables and one negative cable in the output. ■	
11	Input Power Factor	0.9 or better	
12	Efficiency of power supply unit	90% or higher	

13	DC current Ripple	The DC current should be always within $\pm$ 0.5% of the set value. The ripple should be one time demonstrated by the vendor on oscilloscope for all ranges of current on plasma load.	
14	IGBT Heat Sink Cooling	IGBT heat sink should be water cooled or forced air cooled. If air cooling is used, it shall be demonstrated for temperature rise of IGBT & essential components within limit as per standard. The inlet and outlet connection port (manifold) should be provided in case of water cooled. The inlet and outlet temperature of water manifold and the water flow rate should be displayed on HMI. The chiller and compressor unit should be supplied by vendor in case of water cooled. Water inlet and outlet should be through properly tight and panel mounted manifold. Appropriate cooling of heat sink is very important for long run of the power supply. The vendor will have to demonstrate **One time 48 hours power supply operation** at full load (100kW, 125V and 800A) on resistive load during pre-dispatch inspection. Resistive load for testing to be arranged by vendor only.	
15	MCCB	MCCB of suitable rating with shunt release coil should be provided on the power supply panel.	
16	Acceptance Criteria	The pre-dispatch inspection will be carried out in the presence of the engineers from IPR. The power supply would be tested for **Two consecutive successful operations and each testing would be for 20 hours continuous operation at full load i.e. 125V and 800A on the resistive load**. After successful testing on resistive load, the power supply will be tested on the plasma torch load supplied by IPR at the time of pre-dispatch inspection for two consecutive successful testing at full load and each testing would be performed for **8 hours**	

		continuous operation. Vendor will have to arrange the electrical power for testing the power supplies at its premise at the time of pre-dispatch inspection. During SAT (Site Acceptance Test), the vendor will have to demonstrate two successful consecutive successful operations on plasma torch load each for **20 hours operation at full load i.e. 125V and 800A**.	
17	User's Manual	Vendor should supply user's manual mentioning sequence of operation, circuit diagram, wiring diagram with ferrules, troubleshooting chart, preventive maintenance chart etc.	
18	Warrantee	Vendor should provide one year full warrantee of the complete power supply unit and the chiller compressor unit (if supplied in case of water cooled system) from the date of installation and commissioning of power supply at IPR.	
19	Panel support	Panel (Cabinet) should be mounted on heavy duty caster wheels; Panel should also have provision for lifting the panel from the top. Panel door should be mounted on appropriate hinges to smooth movement of the door. The sheet of the panel should have appropriate gauges as per the IS standards for electrical power panel. Vendor should provide the panel details for approval within 20 days from receipt of purchase order for approval in terms of foot print and color of the panel. Panel should be powder coated. The color of panel should be ash grey or light blue with matt finish. All fasteners in the panel should be made of SS 304.	
20	PLC and HMI	Vendor should provide PLC and HMI of reputed company and CE certified company such as Allen Bradley, Siemens, and Schneider etc. Vendor should also supply programming software and soft copy of the PLC and HMI program for operating this power supply. Vendor should provide following **extra** points for future use in each power supply unit:	

		1. Digital output: 20 nos. 2. Digital input: 20 nos. 3. Analog output: 1 nos. 4. Analog input: 1 nos. 5. Temperature input (R type): 4 nos 6. PWM output (8 kHz or higher): 3 nos. The DC power supply to PLC should be 24V, 10A rating through SMPS. 1A fuse through proper housing connector should be used in all input and output lines of PLC except temperature input.	
21	Certification of components	All electrical bought out components should be of standard companies having CE certification for the components. All the components ratings and the wirings should be as per IS standards.	
22	Ambient temperature for designing	The power supply should be designed with considering the ambient temperature of minimum 50 Deg C.	
23	Installation and commissioning of power supply at FCIPT, IPR	Vendor will have to perform installation and commissioning of the power supply at IPR and demonstrate the supply during site acceptance test at FCIPT, IPR.	