TENTATIVE FACTORY ACCEPTANCE TESTS (FAT)

Sl. No.	Characteristics	Type of Inspection / Check	Acceptance
	Plasma control console		
1	Control, monitoring and operation	Physical verification	PLC controlled
2	Type	Physical verification	Fully automatic
3	Plasma power control capability	Plasma gun operation at 40kW	40kW Nominal
4	Process gases	Physical verification	Argon, Nitrogen, Hydrogen
5	Process gases flow rates	Gas flow trials	Hydrogen - 0 to 10 NLPM @ 6bar Nitrogen - 0 to 100 NLPM @ 6bar Argon – 0-100 NLPM@ 6bar
6	Accuracy of gas flow rates	Gas flow trials Verification of flow meter calibration	±2% of the set value
7	Cooling gas	Physical verification	Compressed air
8	Cooling gas Pressure	Gas flow trials	0 to 4bar
9	Cabinet protection classification	Certificate from party	IEC 60529:2013/ latest equivalent
10	Ingress protection	Certificate from party	IP 54/ latest equivalent (for electrical cabinet) IP 33/ latest equivalent (for gas cabinet)
11	Display panel:	Physical verification	LED/LCD display
12	Plasma gases regulation	Physical verification	Mass flow controller
13	Process gases flow rates read out	Physical verification	Display unit
14	Process gas flow rates read out	Physical verification	Display unit
15	Process voltage read out	Physical verification	Display unit
16	Process current read out	Physical verification	Display unit
17	Other features and operational requirements as per tender specifications	Physical demonstration	Tender specifications
	Powder feeder		
1	Capacity	Physical verification	5-12.5 liters
2	Working principle	Physical verification	Volumetric design
3	Control	Physical verification	PLC controlled
4	No of hoppers	Physical verification	2
5	Powder feed rate	Physical demonstration	5 to 300 g/min
6	Powder particle size	Physical demonstration	micro to nano powders
7	Accuracy	Physical demonstration	±1% (of the powder feed rate set value)
8	Carrier gas compatibility	Physical demonstration	Nitrogen/Argon
9	Carrier gas flow rate control	Physical verification	Mass flow controllers
10	Powder compatibility	Physical demonstration	All thermal spray powders
11	Other features and operational	Physical demonstration	Tender specifications

	requirements as per tender specifications		
	Power Supply Unit		
1	Output power	Physical demonstration	40 kW minimum
2	Output current	Physical demonstration	0-550A DC
3	Ingress protection	Certificate from party	IP42/ latest Equivalent
4	Type	Physical verification	Inverter based/IGBT
5	Accuracy	Physical demonstration	2% of the set value
6	Other features and operational requirements as per tender specifications	Physical demonstration	Tender specifications
	Junction and monitoring unit		
1	Cooling water temperature monitoring	Physical demonstration	To be available
2	Cooling water flow monitoring	Physical demonstration	To be available
3	Plasma gas pressure monitoring	Physical demonstration	To be available
4	Voltage monitoring	Physical demonstration	To be available
	Gas Management Unit		
1	Primary (Nitrogen), Primary (Argon), Secondary (Hydrogen) gas flow rate control	Physical verification	Mass flow controller
2	Compressed air pressure control	Physical verification	Proportional pressure control valve
3	Other features and operational requirements as per tender specifications	Physical demonstration	Tender specifications
	Water Chiller unit		
1	Type	Physical verification	Refrigerant type DM water chiller unit
2	Control	Physical verification	Micro controller/PLC controlled
3	Outlet pressure	Physical demonstration	As per PO specification – to be recorded
4	Outlet temperature	Physical demonstration	As per PO specification – to be recorded
5	Outlet flow rate	Physical demonstration	As per PO specification – to be recorded
6	Cooling capacity	Physical demonstration	As per PO specification – to be recorded
7	Other features and operational requirements as per tender specifications	Physical demonstration	Tender specifications
	Electrical distribution unit		
1	Other features and operational requirements as per tender specifications	Physical verification	Tender specifications
2	UPS requirements	Physical demonstration	Tender specifications
	Plasma gun		
1	Power rating	Physical demonstration	min 40kW
2	Suitable for	Physical demonstration	Nitrogen/Hydrogen, Argon/Hydrogen plasma

3	Current	Physical demonstration	500 - 520A as per table 2
4	Hydrogen flow rate	Flow trial	0-20NLPM (nominal)
5	Nitrogen flow rate	Flow trial	0-100NLPM (nominal)
6	Argon flow rate	Flow trial	0-100NLPM (nominal)
7	Ignition	Physical demonstration	soft ignition at lower current with argon
8	Type	Physical verification	Machine mount
9	Cooling type	Physical verification	water cooled
10	Arc initiation and electrode erosion	Physical demonstration	At multiple locations
11	Continuous operation at 40kW power rating	Certificate from party. Later to be demonstrated at IPRC	2.5 hrs
12	Other features and operational requirements as per tender specifications	Physical demonstration	Tender specifications
	Acoustic Booth		
1	Chamber size	Dimensional measurement	Outside dimension : 10000mm x 3700mm x 3600mm (Approx) Inside dimension: 9800mm x 3500mm x 3500mm (Approx)
2	Door opening	Dimensional measurement	3500mm x 3500mm x 3500mm(on two sides ie one side and top) (Approx)
3	Window sizes	Dimensional measurement	1000mm x 1000mm (2 numbers on the door and fixed side wall) 1000mm x 1000mm (1 number on the back wall)
4	Lighting	Physical verification	Dust proof 40W twin tube lights with fixture 4Nos. are to be provided inside the chamber
5	Ventilation	Certificate and hood dimensions calculation by party	10000 m3/hr (approx) fresh air inlet with hood & filter
6	Other features and operational requirements as per tender specifications	Physical demonstration and verification	Tender specifications
	Dust extraction system		
	Type	Physical verification	Dry filter cartridge type dust collection system
1	Particulate to be removed	Physical demonstration	Dust/Powder
2	Capacity	Certification from party	7650 CFM (nominal)
3	Filtration area	Certification from party	greater than 250 m2
4	Number of cartridges	Physical verification	15 -25 nos
5	Dust emission level	Certification from party	10 mg/m3 (nominal)
6	Fractional efficiency	Certification from party	99.999% on 0.5 micron particles
7	Fan Motor capacity	Physical verification	35 HP (nominal)
8	Method of cleaning	Physical verification	Online Pulse jet
9	Exhaust fan	Physical verification	Ground mounted
10	Dust removal system	Physical verification	Manual operated butterfly valve/cam lock dust bin
11	Casing, Impeller, base frame	Physical verification	GI steel/Mild steel

12	Hopper	Physical verification	GI steel/Mild steel
13	Compresses air header	Physical verification	GI steel/Mild steel
14	Filter bags	Physical verification	Non woven polyester spun bond/better
15	Gaskets	Physical verification	Poly isoprene moulded closed cell gasket/better
16	Other features and operational requirements as per tender specifications	Physical demonstration and verification	Tender specifications
	Drive system with Industrial Robot and Tilting turn table		
1	Type	Physical verification	Six axis robot with linear track system
2	Robot reach	Physical demonstration and measurements	The system shall be capable of coating, hardware which are 20% larger in dimensions (3 directions) as compared to the largest hardware
3	Working envelope of gun manipulator	Physical demonstration and measurements	As per PO specifications
4	Loading capacity of the robot	Certification from party and physical demonstration of plasma gun mounting and operation	30kg minimum or suitable for the plasma gun quoted
5	Positional Repeatability	Certificate from OEM	±0.1mm or better
6	Incremental movement	Certificate from OEM	0.1mm or better
7	Path repeatability at 1m/s	Certificate from OEM	<0.4mm or better
8	Control system	Physical verification	Control and drive module with controller software
9	Built	Certificate from OEM	Suitable for harsh thermal spray environment inside an acoustic sound booth
1	Capacity	Certificate from OEM, To be demonstrated after installation at IPRC	800 kg minimum
2	Tilting angle		0 to 90°
3	Tilting accuracy	Certificate from OEM	±0.5°
4	Tilting resolution	Certificate from OEM	0.1°
5	Rotation	Physical demonstration	0-200 RPM
6	Rotation accuracy	Certificate from OEM, To be demonstrated after installation at IPRC	±3 RPM
7	Face plate diameter	Physical verification	1000mm diameter minimum
8	Face plate thickness	Physical verification	35mm minimum
9	Face plate tool fixture	Physical verification	To be suitable for fixing the hardware mentioned in Annexure-A. Additional 3 jaw manual chuck shall also be supplied for mounting small diameter hardware.
10	Face plate run out	Certificate from OEM, To be demonstrated after	<0.1mm

		installation at IPRC	
11	Other features and operational requirements as per tender specifications	Physical demonstration and verification	Tender specifications
	Safety Aspects		
1	The electrical installations	Certification from OEM	EN 60204-11 or other latest equivalent safety standards
2	The pressure regulators and manometers	Certification from OEM	DIN EN ISO 2503 or latest equivalent standards
3	At Hydrogen line, standardized safety devices must be fitted in order to prevent gas flow - back and fire blow out	Physical verification	As per tender specifications
4	Pipes for gases used in the system shall be made of chrome steel and must be checked for pressure leaks and seal tightness	Material certificate and leak check	As per tender specifications
5	Earthing	Certificate from OEM, To be demonstrated after installation at IPRC	Earth resistance value <1 ohms and neutral to earth voltage <2V
6	Proper electrical insulation shall be provided in all the electrical installations	Physical verification	As per tender specifications
7	Emergency push buttons	Physical verification	Shall be provided at various critical subsystems and the same shall be interlocked with the PLC of plasma control console
8	Necessary Pictograms	Physical verification	Shall be made available at different subsystem and various locations wherever required
	Interlocks and Alarm Conditions		
1	Interlock verification	Physical demonstration of the functioning of the interlocks	Interlocks list mentioned in tender specifications