

## 2021-22/02/32 Dielectric strength tester

S. no.	Item	Specification
1	TYPES OF TESTS TO BE PERFORMED	To determine the dielectric breakdown voltage through the thickness of a Polymeric test specimen. It may also be used to determine dielectric breakdown voltage along the interface
2		between a solid specimen in air and oil medium.
3	APPLICABLE STANDARD	Should be complied to ASTM D 149, ISO 1235, BS 2782 Method 201, IS 2484
4	Capacity	0-100 kV(Suitable for BDV up to 100 KV without external flashover). Mode of operation Fully automatic. Breakdown detection should perform in terms of both Voltage and Current.
5	Voltage Source	Suitable step-up Transformer supplied from a variable sinusoidal low-voltage source with Voltage capacities range 0 to 100 kV rms
6		With ratio of crest to root-mean-square (rms) test voltage, equal to
7		$\sqrt{2} \pm 5\%$ (1.34 to 1.48), with the test specimen in the circuit, at all voltages greater than 50 % of the breakdown voltage.
8	Display	Colour display with backlight. The test set should give all the test results with standard deviation, average of reading and a pass / fail message wherever necessary on LCD/LED screen, Instrument should have alphanumeric keypad to facilitate entry of test ID notes etc
9	Frequency	from 25 to 800 Hz
10	Voltage rise time & accuracy	Suitable as per Method A,B, & C of ASTM D 149 & other standard as mentioned.
11	Voltage rise time Resolution	0.1 kV $\pm 1\%$
12	Test Vessels/Medium	Air & Oil medium. Suitable Oil media Tank in line with the requirement of Standard

13	Test Temperature range	Ambient to 100°C. Suitable heaters should be provided for heating oil bath. Test kit should have automatic oil temperature measurement facility with a temperature sensor resolution of 1°C or better.
14	Temperature resolution	1 °C or better
15	Power supply	voltage - 85 to 265 VAC
16		frequency - 50/60 Hz
17	Interface	RS-232 interface , I/O port with safety interlock, USB Host Port for Data/Program storage
18	Protection provided to equipment	Dual safety micro switches on chamber cover. HV Chamber interlocking. Zero starts interlocking Test Kit Trip time should be less than 10 microsec. The HV switch OFF time (automatically) if an established arc of 4 mA occurs for 5 msec should be less than 10 µs.
19	Mandatory Items With the Machine	AC/DC Digital Voltage Meter: 50,100,150,200kV
20		DC micro-ammeter
21		Electrode set of Type 1 to Type 7 as per standard
22	Additional Requirements - Special Features Needed	<ul style="list-style-type: none"> <li>• Vendors must have sufficient experience in supplying equipment to reputed organizations of Plastic/polymer Industries</li> </ul>
23		<ul style="list-style-type: none"> <li>• Magnetic bead stirrers</li> </ul>
24		<ul style="list-style-type: none"> <li>• Sample cutter as per standard.</li> </ul>
25		<ul style="list-style-type: none"> <li>• A suitable Voltage calibrator meter should be provided along with equipment which should be oil free</li> </ul>
26	Other Mandatory Items	While supplying the Machines, the supplier should also provide the following items apart from above:
27		<ul style="list-style-type: none"> <li>• Hard copies of Operational &amp; Service Manual-01Set.</li> </ul>
28		<ul style="list-style-type: none"> <li>• Traceable Calibration certificate of equipment.</li> </ul>
29		<ul style="list-style-type: none"> <li>• External printer with USB interface and PCL3driver</li> </ul>
30		<ul style="list-style-type: none"> <li>• Machine should come with all other essential accessories &amp; spares required for installation, commissioning&amp;Operation</li> </ul>

**2021-22/02/37 Glove box**

S. no.	Item	Specification
1	Purpose	✓ Storage of air sensitive chemicals and fabricated devices.
2		✓ Fabrication of high end electronics, energy storage and energy conversion devices
3	Glove box	Glove box with 4 port
4	Moisture level Requirements	< 1.0ppm
5	Oxygen Level Requirement	<1.0 ppm
6	Environment	Nitrogen and Argon
7	Material of construction	Stainless Steel of high quality (grade to be mentioned by bidder)
8	Box Windows	Transparent safety glass which can retain pressure range of -15mbar to +15mbar
9	Pressure	Automatic Pressure control from-15 mbar to+15mbar with oil free over pressure relief valve
10		✓ Continuous Digital Pressure monitoring of the glove box
11	Display of Reading	High accuracy sensor based reading of moisture and oxygen level in ppm levels to be displayed at all-time along with Glove box pressure, purging condition, regeneration etc. which should be monitored/controlled through a plc based control system. Provision for 24/7 remote monitoring facility is required.
12	Box	• Scratch proof coating to protect the inner and outer housing
13		• Dust filter of 0.3 micron
14		• Gas inlet and outlet filter.
15		• 3 height adjustable shelves
16		• 3 Electrical feed through
17		• Stand for the box along with levelling
18		• Foot pedal control of the internal pressure
19		• Waterproof
20		• One antechambers made up of stainless steel with metal doors which can be interlocked to maintain pressure range of -10 mbar to 10 mbar.
21		• Pressure gauges to monitor the pressure.

22	Antechamber Large	<ul style="list-style-type: none"> <li>• Metal Sliding tray to transport sample</li> </ul>
23		<ul style="list-style-type: none"> <li>• Manual Control of Vacuum and Refill process</li> </ul>
24		<ul style="list-style-type: none"> <li>• Door lock easy to operate with a spindle lock system</li> </ul>
25		<ul style="list-style-type: none"> <li>• One large antechamber for transporting larger volume inside the glove box. At least 390 mm diameter, 600 mm length</li> </ul>
26	Antechamber Small	<ul style="list-style-type: none"> <li>• Small Antechamber to allow transfer of Min. 100 mm Petridis diameter.</li> </ul>
27		<ul style="list-style-type: none"> <li>• 3 way valve control with analog pressure gauge.</li> </ul>
28	Gas purification	<ul style="list-style-type: none"> <li>• Closed loop gas purification with attainable moisture and oxygen level of &lt; 0.1 ppm over complete pressure range for the complete volume of gas.</li> </ul>
29		<ul style="list-style-type: none"> <li>• Accessories and columns required for the gas purification should be provided by bidder.</li> </ul>
30	Circulation Unit	Suitable blower with 80m <sup>3</sup> /hour or better capacity should be provided with the unit for adequate circulation along with other accessories. Should be fitted with heat exchanger and suitable recirculation unit.
31	Regeneration	Automatic regeneration control and electronic control of inlet and outlet of regeneration gas.
32	Vacuum Pump	Rotary Oil Pump of industrial required which will be capable of running 24hours. The pump should have an oil mist filter and control for gas ballast. 17m <sup>3</sup> /hour capacity or better
33	Control System	Rotary vane mechanical vacuum pump with necessary moisture and vapour traps details should be provided
34	Running Time	The instrument and the ancillary vacuum pumps should be capable for running 24 hours
35	Box Dimensions and number of ports	<ul style="list-style-type: none"> <li>✓ <input type="checkbox"/> Suitable dimension to allow minimum 4 port in front to be used for accessing the box.</li> </ul>
36		<ul style="list-style-type: none"> <li>✓ Typical dimension of each glove port would be 200mm-220 mm diameter</li> </ul>

37	Chemical Storage Requirements	The glove box and its parts should be compatible for storage and usage of
38		<ul style="list-style-type: none"> <li>Organic solvents both chlorinated and unchlorinated.</li> </ul>
39		<ul style="list-style-type: none"> <li>Use of electrolytes and ionic liquids</li> </ul>
40		<ul style="list-style-type: none"> <li>Intermittent usage of acids and bases</li> </ul>
41	Box Light	1 or 2 tube light front mounted with adequate illumination.
42	Valves and Piping	<ul style="list-style-type: none"> <li>Pneumatic Valve to control pressure in case of gas shut down for at least 12 hours.</li> </ul>
43		<ul style="list-style-type: none"> <li>Stainless Steel Piping</li> </ul>
44	Oxygen Analyzer	PLC controlled analyzer to monitor from 1–1000 ppm
45		<ul style="list-style-type: none"> <li>Operating Temperature: ambient to 35°C</li> </ul>
46		<ul style="list-style-type: none"> <li>Pressure - 800 - 1200 hPa</li> </ul>
47		<ul style="list-style-type: none"> <li>Sensitivity - 10 mV/ppm(v)</li> </ul>
48		<ul style="list-style-type: none"> <li>Response time - &lt; 10 sec</li> </ul>
49		<ul style="list-style-type: none"> <li>Accuracy: +/- (2 % of displayed value + 1 ppm)</li> </ul>
50		<ul style="list-style-type: none"> <li>Zero Stability: &lt;1 ppm/24 h</li> </ul>
51		<ul style="list-style-type: none"> <li>Repeatability: +/- 1% in full range</li> </ul>
52		<ul style="list-style-type: none"> <li>Resolution: +/- 0.1% in full range</li> </ul>
53		<ul style="list-style-type: none"> <li>Solid state type</li> </ul>
54	<ul style="list-style-type: none"> <li>Should be free from frequent Calibration</li> </ul>	
55	Moisture Analyzer	PLC controlled analyzer to monitor from 1–500 ppm
56		Solid state type
57	Filters	Charcoal Filter or better system for moisture removal to achieve the required level of moisture as specified.
58	Catalyst for Oxygen	Suitable technology for oxygen removal to achieve the required level as specified
59	Energy Conservation	Any energy conservation technology would be preferred
60	Others	<ul style="list-style-type: none"> <li>Piping and fittings Should be made of stainless steel</li> </ul>
61		<ul style="list-style-type: none"> <li>Electrical - Lighting: Internal LED/fluorescent lamp and provision of electrical points inside the chamber with leak proof sealing</li> </ul>
62		<ul style="list-style-type: none"> <li>Operating voltage: 230 V (<math>\pm 10\%</math>), 50 Hz</li> </ul>

63	Accessories	• Additional 03 pair of gloves and O rings
64		• Rotary oil
65		• Nitrogen and argon cylinder with regulator
66		• Required additional accessories should be provided.

**2021-22/02/48 Semiconductor measurement with Probe Station**

S. no.	Item	Specification
1	Purpose	An Electrical Characterization System to perform device characterization, real-time plotting, and analysis with high precision and resolution, while remaining a highly integrated, flexible, upgradable and user-friendly package.
2		The system should be capable to perform the I-V and C-V characterization of Thin Films, Electronic materials, Semiconductor devices, Solar Cells, High resistive materials and nano materials etc.
3	Features	• Single box solution for current-voltage (IV), CV, pulse generation upgradable (Fast IV) capability with built in PC.
4		• Slot system for Source measure unit (SMU), Capacitance-voltage unit (CVU) and pulse IV modules.
5		• Should be compatible with automatic/semiautomatic prober.
6		• All SMU should provide voltage/current in Bias; Common; Sweep; List sweep (custom point-by-point user-defined sweep); Step mode.
7		• SMU should able to apply pulse in mS range.
8	No of SMU	3 expandable upto 9
9	Type of SMU	High Power -1; Medium-2
10	Display	Built in 12.5 TFT display or better
11	Voltage Source and measure range	200 mV to 200V or better
12		
13	Voltage Resolution	Source: 5 $\mu$ V and measure: $\pm$ 200nV or better
14	Current Source and measure ranges	1 pA to 100mA or better

15	Current Resolutions	Source: 1.5pA Measure: $\pm 100$ aA or better
16	Built in C-V Measurement capability	Frequency Range:1KHz to 10 MHz variable.
17		DC Voltage Bias: + / - 30V / 1mV resolution.
18		
19		
20		
21	System should have Very Low Frequency CV capability.	Frequency range: 10 mHz to 10 Hz.
22		Voltage: up to 200 V.
23		VLF measurement models: CS-GS, CP-GP, Z theta, Cs-D, Cp-D, R+jX.
24	Hardware/ Architecture	In-Built PC platform with windows-OS, having LAN; GPIB; USB; RS232; parallelport; HDD, CD-RW; Should provide libraries / projects for measurement of device parameters for semiconductors.
25	Power requirement	230V AC, +/- 10%; 50Hz.
26	Accessories	Low Noise Triax Cable-03
27		Piv Demo Fixture
28	1. System should have built in Capability to switch the measurements from IV, CV to optional upgradable Pulsed IV from select menu without changing the connections on the DUT.	
29	2. System should have Kelvin connection at GND unit.	
30	3. System should have feasibility write different customized test routine for hardware configuration. System should have facility to modify or write user test modules.	
31	4. Provided software should have parameter extraction facility.	
32	5. System to be supplied along with two numbers of triaxial to alligator cables.	
33	6. The Instrument should have capabilities of self-test, calibration and diagnostic.	
34	All standard accessories should be supplied with the Instrument.	
35	The Instrument should be provided with built in software having following features:	
36	Following kind of I-V measurement using current source or voltage source.	
37	1. (i) Voltage vs current for high resistance,	
38	2. (ii) Current vs voltage for low resistance devices	
39	3. (iii) Two terminal I-V for diode	
40	4. (iv) Three terminal I-V for MOSFET.	
41	5. (v) Four probe resistivity measurement.	
42	b) Live graph plotting.	
43	c) Parallel testing of two resistor/thin films.	
44	d) Testing of three terminal devices.	
45	e) The provided software should have parameter extraction facility and analysis.	
46	<b>Probe Station (4 Inch wafer)</b>	
47		o The Probe System must be able to support the following on-wafer

48		○ measurement setup
49		○ DC and CV (DC to 5MHz) parametric
50		○ measurements
51	Specifications of Manual 4 Inch wafer probe station - Parameters	○ DC Probe card measurement setup. The chuck should be RF compatible.
52		○ IV / CV measurements applications
53		○ RF probing (East/West/North/South Configuration)
54	Probe System Integration.	• Chuck Stage Movement - Manual
55		• Chuck X-Y Stage - Independent X and Y Axis control of the chuck stage
56		• X-Y stage travel range $\geq 100$ mm (X axis) $\geq 100$ mm (Y axis)
57		• Chuck Z Stage measurement sub-systems Optimized Z Stage movement to keep the DUT in focus during probing.
58	C-4 Mini Station	• 4" Gold plated Aluminium Vacuum Chuck
59		• Vacuum Rings x2 for wafer 4" and single die
60		• Coaxial Chuck Stage X-Y 4"-4"
61		• Resolution 10 micron
62		• U Platen Bar (Ferro, Hard chrome plated)
63		• Chuck UP/DOWN -5 mm-Z motion
64		• Chuck Theta 15 degrees
65	Stereo Microscope	• E.P.10X-30X
66		• Zoom 1X~ 5X
67		• Total Mag. 10X~150X
68		• LED light source
69		• CMOS Digital Camera:
70		• CMOS digital Camera with imaging kit: Digital CCD
71		• 3MP, CCD Adapter, Calibration software
72		• Micro positioner EB-050DC/RF Linear X-Y-Z Travel 12mm-12mm-
73		• 12mm 80 Thread/Inch (Res. 0.8 micron per degree)
74		• Magnetic ON/OFF Base
75		• Platen maximum number of positioners - $\geq 10$ no's



76	Platen	<ul style="list-style-type: none"> <li>Loading and Unloading of Wafer - The systems should support front loading and unloading wafer with clear view of the wafer or substrate</li> </ul>
77		<ul style="list-style-type: none"> <li>vacuum control, integrated service loop for stable X Stage Movement. All Safety Hazards must be clearly indicated</li> </ul>
78	Wafer Chuck System	<ul style="list-style-type: none"> <li>Minimum Wafer Size - 10 mm dia</li> </ul>
79		<ul style="list-style-type: none"> <li>Maximum Wafer Size Support - <math>\geq</math> 100mm dia</li> </ul>
80		<ul style="list-style-type: none"> <li>Chuck Diameter - <math>\geq</math> 100mm dia</li> </ul>
81		<ul style="list-style-type: none"> <li>Chuck Surface condition - Gold Plated Aluminium with vacuum holes actuation Chuck Surface Flatness or Planarity - <math>\leq</math> 10 <math>\mu</math>m</li> </ul>
82	Wafer Chuck	<ul style="list-style-type: none"> <li>Triaxial type Tip Holder - Spring type:</li> </ul>
83		<ul style="list-style-type: none"> <li>Triaxial cable 1.5-meter-long terminated with triax male.</li> </ul>
84		<ul style="list-style-type: none"> <li>For CV measurement: shield terminated with crocodile clip to ground with Chuck.</li> </ul>
85		<ul style="list-style-type: none"> <li>Dry Vacuum pump-7 Lit/min: suitable to system with all tubing and vacuum switches.</li> </ul>
86		<ul style="list-style-type: none"> <li>Probe tips: 5-micron dia (Box of 10)-2</li> </ul>
87	<ul style="list-style-type: none"> <li>10-Micron dia -Gold plated tungsten tips</li> </ul>	
88	Hot Chuck:	<ul style="list-style-type: none"> <li>Vacuum Chuck for wafer 4" and less with individual vacuum switches,</li> </ul>
89		<ul style="list-style-type: none"> <li>Room Temp ~ 200 °C,</li> </ul>
90		<ul style="list-style-type: none"> <li>DC –Powered, PID Controller</li> </ul>

**2021-22/02/49 Shore hardness tester A & D**

S. no.	Item	Specification
1	Purpose	It is an instrument which is used to measure the hardness of a material. Hardness may be defined as a material's resistance to permanent indentation.
2	Principle/ Definition	Resistance of solid matter to various kinds of permanent shape change when a compressive force is applied.
3	Reference Standard	Should be complied to ASTM D2240, ISO 7619, ISO 868

4		Shore A	Shore D
5	Test Scale	(hardness testing of soft rubber, plastic and such substances)	(hardness testing of hard rubber, plastic and such substances)
6	Display	Bright & clear LCD display	Bright & clear LCD display
7	Result display	Hardness result, average value, max value (peak value lock), battery indication	Hardness result, average value, max value (peak value lock), battery indication
8	Data output	RS232	RS232
9	Measuring range	0~100HA	0~100HD
10	Tolerance	$\leq \pm 1HA$ (between 20~90HA)	$\leq \pm 1HD$ (between 20~90HD)
11	Display resolution	0.2 HA	0.2 HD
12	Statistics	Highest hardness, average	Highest hardness, average
13	Operating temperature	0 – 40 °C	0 – 40 °C
14	Features	Automatic switch off, battery low alarming	Automatic switch off, battery low alarming
15	Power Supply	3 x 1.5V-Buttonbatteries or 4.5V AC/DC adapter	3 x 1.5VButton batteries or 4.5V AC/DC adapter
16	Other features	Pocket size model with integrated probe	
17	Other Mandatory Items	While supplying the Machines, the supplier should also provide the following items apart from above:	
18		<ul style="list-style-type: none"> <li>Hard copies of Operational &amp; Service Manual- 01 Set..</li> </ul>	
19		<ul style="list-style-type: none"> <li>Machine should come with all other essential accessories, computer &amp; spares required for installation, commissioning&amp; Operation</li> </ul>	
20		<ul style="list-style-type: none"> <li>Onsite Training to be provided for CIPET staff at commissioning site.</li> </ul>	

**2021-22/02/52 Thermal Evaporator System**

S. no.	Item	Specification
1	Application	Thermal Evaporation system should be capable of depositing metals / metal oxides / ceramics with uniform film thickness

2	Vacuum Chamber	<ul style="list-style-type: none"> <li>SS 304 Metal Chamber fabricated from polished stainless steel.</li> </ul>
3		<ul style="list-style-type: none"> <li>Approximately 16" x 16" x 18" Height with front door opening.</li> </ul>
4		<ul style="list-style-type: none"> <li>Cooling water pipeline is coiled on the outer wall of the chamber to prevent overheating, especially at the chamber windows and to reduce the out gassing by circulating the water and viewing window. There should be provision for necessary feed through.</li> </ul>
5		High Vacuum Pumping System:
6	<ul style="list-style-type: none"> <li>Rotary pump (with appropriate oil/mist filter) for creating initial vacuum till <math>10^{-3}</math> mbar and backing for the turbo pump after that.</li> </ul>	
7	Rotary Vacuum Pumping System	(1 No) Capacity 250 LPM, Direct drive, Single phase, Double stage, Oil charge 0.75liters, Ultimate vacuum $> [5-6] \times 10^{-3}$ m. bar.
8		The pump should be capable for running 24 hrs.
9	Turbo Pumping System	nEXT400D ISO100 160W with inlet screen and manual vent valve Having Field replaceable bearing.01No.
10		01.Effective Pumping speed - $>300$ (LPS)
11		02. Ultimate vacuum - $10^{-7}$ (m. bar)
12		03. Critical backing pressure - $3.5 \times 10^{-1}$ m. bar.
13	Motorized High Vacuum poppet type valve	<p>Motorized high vacuum Poppet type valve with built in facility to automatically throttle the pumping system by 'cracking' the valve, for maintaining accurate process pressure for plasma processes. This valve isolates the chamber from the pumping system so that the chamber can be brought to atmospheric pressure without switching off the pumping system.</p> <p>The Drawing of Poppet valve should be provided along with the Technical bid.</p>

14	Electro magnetically operated right angle valves	Electro magnetically operated right angle bellow sealed valves for roughing , backing and high vacuum applications
15	(1 No) Electro magnetically operated Vent valve	suitable size Electro magnetically operated Vent valve is fixed to the chamber pipeline to release the chamber vacuum after each coating process cycle
16	Needle Valve	[2 Nos] along with the unit for gas purging. A fine control needle valves providing in the pipeline for use during H.T. discharge cleaning.
17	L.T/H.T Control	Thyristor Controller in the input circuit of LT/HT selector provides the output power variation.
18	Meters	Separate digital panel meters provided for HT primary current LT secondary current through current transformers
19	Indicator Lamps	Glow lamps are to indicate ON/OFF status of rotary pump, Turbo pump, LT, HT and other accessories.
20	Power connection	For connection the power to the system 2 meters long 15amps wire chord with plug.
21	Vacuum Measuring Gauges	<b>Digital Pirani Gauge</b> -(1 No): Measure vacuum from 0.001 to 1000 m.bar anywhere in the vacuum system with suitable adaptor. Two gauge heads should be to this gauge to read fore vacuum and roughing vacuum of the system.
22		<b>Digital Penning Gauge</b> - (1No): Measure vacuum from $9.9 \times 10^{-3}$ to $1.0 \times 10^{-6}$ m.bar anywhere in vacuum system with suitable adaptor.
23	LT Evaporation Feedthroughs	Atleast 3 No. of LT electrical feed-through for evaporation, made of electrolytic pure copper with 200Amps current carrying capacity should be provided.

24	Substrate Holder, Heater & Rotation	<p>Capable of holding various dimensions of substrate 100 mm or higher diameter disc or multiple smaller size substrates. Designed for long, trouble free operation. Rotation speed adjustable 20rpm or higher. A suitable Substrate Heater should be provided for varying substrate temperature from RT to a maximum of 500 Deg.C with a thermocouple and PID temperature controller. The substrate heater should be oxygen compatible up to maximum temperature. Temperature accuracy should be within <math>\pm 5</math> Deg.C Substrate rotational capability at elevated temperature. Simultaneous rotation &amp; heating mechanism.</p>
25	Substrate cooling facility	To be provided through water piping (as main quotation).
26		Liquid nitrogen cooling facility can be provided as additional cost.
27	Digital Thickness monitor	<ul style="list-style-type: none"> <li>Appropriate feed through and sensor to be provided close to the LT source.</li> </ul>
28		<ul style="list-style-type: none"> <li>Ability to monitor evaporation rates of 0.1 Å/s</li> </ul>
29	Quartz Crystal Thickness Monitor (DTM):	<ul style="list-style-type: none"> <li>6 MHz crystal holder with oscillation box and connecting cables.</li> </ul>
30		<ul style="list-style-type: none"> <li>Display:3digit LED.</li> </ul>
31		<ul style="list-style-type: none"> <li>Thickness Display 4Digit LED auto ranging from 0.000 to 999.9 Å,</li> </ul>
32		<ul style="list-style-type: none"> <li>Crystal Frequency: 6MHz</li> </ul>
33		<ul style="list-style-type: none"> <li>Thickness Set point 0.000 to 999.9KÅ,</li> </ul>
34		<ul style="list-style-type: none"> <li>Film Dencity:0.800 to 99.99grams/cc.</li> </ul>
35	Control Console	Control console is fabricated with mild steel and neatly powder coated. It is provided to house all the electrical control instrumentation, control switches and standalone control panel of the following switches;
36		<ul style="list-style-type: none"> <li>✓ ON/OFF switches for vacuum pumps and all valves</li> </ul>

37		✓ vacuum measuring gauges controller
38		✓ Substrate rotation and substrate heater controls
39		The above control console is wired to operate on 230 V AC, 50Hz, Single phase power supply.
40	Support structure	• Should be made out of MS channel and angles, neatly painted
41		• Must have castor wheels for mobility purpose.
42	Source shutter	To cover the evaporation source
43	Electrical Controls	Unit operates on 220V A.C 50Hz single phase power supply.
44	L.T Power Supply	A 200Amps power supply capable of delivering (3 nos)
45	H.T Power Supply	5000volts DC open circuit.
46		3500volts at 50mA high reactance type-1NO
47	Safety Devices	An electrical circuit breaker in different power supply line protects these against over-load shorting. An over load protection device for vacuum pump motor should be provided.
48	Ultimate Vacuum	The unit is specified to achieve an ultimate vacuum of $1 \times 10^{-6}$ m.bar in clean cool empty degassed condition within 1 hour of switching on of the pumping system.
49	Purging	Nitrogen and Air purging facility should be available
50	Manual	Operation Manual to be given after delivery and installation
51	Inspection	CIPET will inspect the instrument for two complete runs before despatch from factory outlet.
52	Water Chiller	• Suitable capacity Water chiller to be provided for the whole unit with interlocks, tank, etc.