

1. Battery Pouch Cell Fabrication Facility		
Sl. No.	Specification	Range / Value
<b>1.Vacuum Slurry Mixing Machine for Electrode Preparation – 1 Nos</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
1a.	Application	<ul style="list-style-type: none"> <li>· To produce coating slurry by mixing small batch of chemical and compound under vacuum to remove gas bubble and protect sample from oxidation.</li> <li>· To prepare the battery electrode paste and various ceramic materials paste</li> </ul>
1b.	Features	<ul style="list-style-type: none"> <li>· The equipment should comes with a two-axis planetary stirring structure, agitator mixing paddles, and different mixing shaft forms and combinations according to the size of the mixing tank.</li> <li>· Designed the positive and negative stirring function, which can achieve high speed mixing of higher viscosity slurry, good mixing uniformity</li> <li>· Vacuum environment, effectively remove the bubbles generated by the mixing process, the machine comes with a vacuum system</li> <li>· Multi-speed operation, set the stirring speed and time of each section, automatic mixing and shutdown</li> <li>· Elastic bracket design for easy operation and safety during vacuum mixing process.</li> <li>· Programmable controller to set time, speed, rotation direction</li> </ul>
1a.	Rotation Speed	Upto 600 RMP
1b.	Jar volume	500 ml and 250 ml
1c.	Jar Material	double layer - 304 stainless steel container
1d.	Vacuum Pump	In build Vacuum Pump
1e.	Vacuum level	-0.08Mpa or better

1f.	Mixing Time	0 ~ 600 min; adjustable
1g.	Voltage & Power	220V, 50 Hz & 200 W
1h.	Jars	Need Separate Mixing Jar for anode and cathode mixing and it should mark on the surface with jar head for 500 and 250ml
<b>2.Small Planetary Ball Mill for electrode preparation – 1 Nos</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
2a.	Application	· Uniformly mixing the electrode materials such as active material, binder, conductive additives
2b.	Feature	· The Planetary ball mill is small, full-featured, high efficiency and low noise.
		· It can set the speed, forward and reverse rotation time, and the total grinding time according to process requirement.
		· Operation can be programmable
2c.	No of Grinding Jars	4 Nos or more
2d.	Grinding Jar volume	250 ml
2e.	Grinding Jar Material	Polytetrafluoroethylene (PTFE) or equivalent
2f.	Grinding ball Material	Polytetrafluoroethylene (PTFE) or equivalent
2g.	Ball diameter	2, 5, 10, 15, 20, 25 mm
2h.	No of balls	Each diameter minimum 25 nos.
2i.	Total running time setting	1~9999 min
2j.	Alternating Run Time of Forward & Reversal Rotation	1~999 min
2k.	Speed mode	Frequency, programmable step less speed regulation, manual, automatic timing forward and reverse
2i.	continuous operating time	50 hr or more
2m.	Rotating Speed	Revolution: 335 r/min,
		Rotation: 670 r/min

2n.	Speed ratio (revolution: rotation)	1:2
2o.	Accessories	· PTFE jar: Extra 10 Nos
		· ZrO <sub>2</sub> coated SS Jar: 4 Nos
		· ZrO <sub>2</sub> ball: 2, 5, 10, 15, 20, 25 mm dia with 25 nos of ball at each size
<b>3. Slurry Filtration Machine – 1 Nos</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
3a.	Feature	· With full stainless steel design, good anticorrosion materials, easy to clean the Jars
		· Vacuum system to realize the filter, different mesh number can be configured according to demand.
3b.	Filter screen	80mesh to 120 mesh
3c.	Capacity	500 ml & 250 ml
3d.	Pump Flow	3 L/min
3e.	Vacuum degree	65 kPa
3f.	Vacuum	Provide the suitable vacuum system
3g.	Filter dimensions	145*150*200 mm
<b>4. Digital Viscometer – 1 Nos</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
4a.	Features	· With timing measurement function
		· Coaxial cylinder structure
		· The measurement accuracy of the data will be two decimal places
		· Easy to operate and reliable
		· Uses a small number of sample adapters, requiring very little sample
4b.	Display method	Backlit LCD, digital display or equivalent

4c.	Rotating speed(r/min)	Total 18 types: 0.3/0.6/1.5/3/6/10/12/15/20/25/30/40/50/60/70/80 /90/100
4d.	Rotor	18#, 25#, 31#, 34#
4e.	Viscosity Measuring range (mPa.s)	1- 1,600,000
4f.	Sample volume	· Rotor 18: 30,000 to 10,000; sample volume - 7ml
		· Rotor 25: 4.8-1.6 million; sample volume - 9ml
		· Rotor 31: 300,000 to 100,000; sample volume -10.5ml
		· Rotor 34: 200,000-200,000; sample volume - 11ml
4g.	Measurement error	±2% (Newton liquid)
4h.	Repetitive error	±1% (Newton liquid)
4i.	Output Interface	There are two RS232 interfaces to connect the printer and computer
4j.	Temperature probe interface	Standard
<b>5.Roll to Roll Coating Machine – 1 No</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
5a.	Application	· Roll to Roll coating machine will be used for coating the electrode. It adopts continuous coating mode, will mainly use for lithium battery lab research and pilot scale production line.
5b.	Max Electrode Width	330 mm or better
5c.	Coating Speed	· 1m/min or better,
		· Adjustable coating speed
5d.	Coating Accuracy	≤ ± 0.003 mm or better
5e.	Roller Diameter	Φ100mm
5f.	Max Coating Roller Dia.	Φ250mm
5g.	Control Pressure	· 5-50N or more,
		· Adjustable

5h.	Dry Temperature	RT-150 °C or higher, adjustable
5i.	Oven Length	1.2 m or longer
5j.	Air Compression	0.5-0.7 MPa
5k.	Coating Mode	Single face continuous coating & intermittent coating
5l.	Application Foil	Aluminium foil, Copper foil, etc.,
5m.	NMP Recovery System	Exhaust Provision for NMP Fumes, should include the Piping for the same
5n.	Other Specifications	The parts are processed precisely; slurry contact part is stainless steel.
		The main drive adopts frequency conversion speed control, the speed range is constant and reliable, and it is a constant torque speed control system.
		The drying box adopts a far-infrared heating tube, high thermal efficiency, long service life and simple installation.
		Using hot air circulation system, can make temperature uniform and not easy to burn the electrode foil.
		The temperature control adopts PID adjustment system, high control precision and reliable operation.
		· The winding adopts an automatic correction system to make electrode rectify.
		· Gap tracking system for double side coating
		· Continuous and intermittent coating can be changed freely.
		· Tension control, it's equipped with correction device automatically by EPC system and accuracy must be ±2mm
· PLC control, high automation.		
<b>6. Roll to Roll Hot Roller Press - 1 Nos</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
6a.	Roller Width	330 mm

6b.	Structure	· Heavy duty steel frame, gears and handle
		· $\Phi 96$ mm Dia. x 330 mm width Rollers made from hardened tool steel (HRC > 62) with Cr electroplated coating
		· Dual micrometer for accurate thickness adjustment in the range 0 - 2 mm
		· Equipped with a transparent protective plate
6c.	Roller	· Dimensions: 96 mm (Dia.) x 330 mm (W)
		· Material: Made from hardened tool steel (HRC > 62) with Cr electroplated coating. With finish > 0.8
6d.	Rolling press accuracy	$\leq \pm 0.005$ or better
6e.	Rolling press thickness	0-2 mm adjusted with Dial gauge
6f.	Rolling press width	Max 330 mm
6g.	Rolling press speed	0-40 mm/s adjustable; 6m/min
6h.	Temp.	130 °C or higher
6i.	Other Features	· Roll to roll pressing capacity for pressing the electrode with temperature option
		· The pressing thickness is adjustable.
		· It is designed with tension control.
		· Winding & unwinding device with correction function.
<b>7. Vacuum Oven– 2 Nos</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
7a.	Volume	25 liters or more
7b.	Temperature range	Upto 250 °C or more
7c.	Temperature fluctuation	$\pm 0.5$ °C or better
7d.	Vacuum degree	-0.1MPa or better

7e.	Temperature controller	·High precision microcomputer temperature PID controller, accurate temperature control
		·Working temperature can be set and working time can be set, error alarm function
		· Temperature control accuracy: +/-1°C or better
		· Temperature uniformity: +/-5°C or better
7f.	Inner box material	304 stainless steel
7g.	Outside shell material	High quality cold-rolled steel plate electrostatic spray
7h.	Box door	Toughened bulletproof double glass door
7i.	Safety device	With over temperature protection, grounding etc
7j.	Shelf	· 2 No
		· Solid stainless steel shelf, guarantee the oven temperature
		· Mesh stainless steel shelf for air cycle
7k.	Vacuum pump	· Suitable vacuum pump
		· Fittings: KF25 port is built-in for connecting a vacuum pump
		· Rotary oil sealed vacuum pump with vacuum gauge, Oil trap, Moisture trap and Exhaust moisture filter
7l.	Visual window	· Double toughened explosion-proof glass door allowing observe the inside material easily.

<b>8. Pouch Cell Electrode Die Cutter – 1 No</b>		
		<b>Make to be Mentioned</b>
		<b>Model to be Mentioned</b>
8a.	Feature	· Different size of cutting die
		· The cutting no burr, no coated material drop.
		· 2 Start buttons , the die can only go down only when pressing the 2 buttons at the time
		· Long lifetime for the cutting die, >30000 times.
		· It is designed with counter, the operator can know the cutting numbers easily.
		· It is semi-auto, high cutting speed.
8b.	Max Bed Area	Max L 400xW300mm,
8c.	Max cutting die size	Max L300xW250mm, should be customized in future
8d.	Cutting accuracy	±0.1mm or better
8e.	Pressure	Max 3T, 0.7Mpa is suggested to cut battery electrode.
8f.	Material feeding	Manual
8g.	Piston Stroke	100 mm
8h.	Power Stroke	12 mm
8i.	Safety Features	Safety Curtains & Acrylic cover for all three sides
8j.	FRL UNIT	Filter and regulator for air control
8k.	Anti Rotation Guide	For Finding out the location of Die should be included with machine
<b>9. Semi Automatic Battery Stacking Machine – 1 No</b>		
		<b>Make to be Mentioned</b>
		<b>Model to be Mentioned</b>
9a.	Feature	· Semi Automatic battery stacking machine will be used for lithium battery stacking process, put the cathode, anode electrode and battery separator Z shaped lamination.
		· Swing stroke: 400 mm or better
		· Correction accuracy: 0.05mm or better



9b.	Stacking Layer Length	L (0-150) mm, W (0-150) mm or more
9c.	Max Separator Feeding Diameter	Φ250 mm
9d.	Fixed Travel Distance	400 mm
9e.	Travel Cycle	1 - 9999 cycles
9f.	Air Supply	0.25-0.55MPa (40 - 80 psi)

**10. Ultrasonic Welding Machine for Pouch Cell – 1 No**

		<b>Make to be Mentioned</b>
		<b>Model to be Mentioned</b>
10a.	Features	Present welding programs selectable for Al and Cu (Note: Welding power can be readjusted to fit the needs for welding other types of metals such as Au, Fe, Ni, Ag...).
10b.	Mode	Tow modes: Automatic, Manual
10c.	Input Voltage	220V +/-10%, 50Hz
10d.	Max. Power Consumption	2000 W
10e.	Welding Area	4mm(L) x 8 mm(W) or higher can be possible to customized
10f.	Welding Head	The welding heads and welding base are included for welding both aluminium & copper current collectors from 2 to 25 layers
10g.	Ultrasonic Frequency	40KHz
10h.	Product Dimensions	Controller: 360mm(L) x 480mm(W) x 200mm(H) Welder: 200mm(L) x 460mm(W) x 270mm(H)

**11. Pouch Cell Case/Cup Forming Machine– 1 No**

		<b>Make to be Mentioned</b>
		<b>Model to be Mentioned</b>
11a.	Feature	<ul style="list-style-type: none"> <li>· Four guide column structures for smooth sliding up and down.</li> <li>· It is simple and quick to change the mold and adjust the stretching depth.</li> <li>· Compared with similar products, when use the same quality aluminium laminated film, this machine stretches deeper and more stable.</li> </ul>

		<ul style="list-style-type: none"> <li>· Precise mold design, no crow's feet and sag at each corner of the product after forming.</li> </ul>
		<ul style="list-style-type: none"> <li>· Protected by light curtain and cover, safe to use.</li> </ul>
		<ul style="list-style-type: none"> <li>· Easy to operate, safe and reliable, small size.</li> </ul>
11b.	Suitable aluminium film size	150*150 mm(L*W) customized, with punching depth ≤6mm
11c.	Max Bed Area	Max L 400 x W300mm
11d.	Suitable aluminium film thickness	0.1-0.2 mm
11e.	Max. Cup Depth to Punch	Single pit punching depth ≤ 6 mm
11f.	Output pressure	5T or more with Adjustable
11g.	Air source	0.5-0.7MPa
11h.	Mold part	<ul style="list-style-type: none"> <li>· Mold/core roughness: : 0.4 (mirror reflection)</li> </ul>
		<ul style="list-style-type: none"> <li>· Upper and lower die flatness: 0.02mm</li> </ul>
		<ul style="list-style-type: none"> <li>· Core flatness: 0.02 mm</li> </ul>
11i.	Mold material	<ul style="list-style-type: none"> <li>· High-strength chrome steel and alloy aluminium or S136 Die steel or equivalent material</li> </ul>
		<ul style="list-style-type: none"> <li>· The surface is treated with environmentally friendly plating and baking finish.</li> </ul>
11j.	Piston Stroke	100mm
11k.	Power Stroke	12 mm
11l.	Safety Features	Safety Curtains & Acrylic cover for all three sides
11m.	FRL UNIT	Filter and regulator for air control
11n.	Anti-Rotation Guide	For Finding out the location of Die should be included with machine

<b>12.Pre-sealing &amp; Diffusion Machine for Pouch Cell – 1 No</b>		
		<b>Make to be Mentioned</b>
		<b>Model to be Mentioned</b>
12a.	Max. Power	500W
12b.	Compress Air	0.5-0.8Mpa
12c.	Chamber Body	12mm thick Aluminium case with observation window
12d.	Vacuum Level	Vacuum condition remains stable, vacuum degree and vacuum circulation times can be set independently
		Vacuum mode (once or twice) can be selected
		Easy program setting for specific vacuum condition
		Vacuum degree can up to -90Kpa~0, with good sealing, can guarantee 1 minute air leakage is not more than 0.01 Mpa
12e.	Vacuum Condition Hold Time	0 - 9999 sec, adjustable
12f.	Sealing advantage	1 Sealing Head adopts copper material, good heat transfer effect,
		2 With adjust plate, Can apply to different specifications battery, and the adjusting easily
12g.	Sealing head temperature	RT-250°C, adjustable or higher
12h.	Temperature accuracy	±2°C or better
12i.	Heat sealing pressure	0~7Kg/cm <sup>2</sup> , adjustable
12j.	Hot Sealing Time	0~100s, adjustable
12k.	Sealing Blade	Hard type (without rubber, only for Al case sealing, not suitable for sealing case with tab in between)
12l.	Sealing width	5mm, customized
12m.	Sealing head length	200 mm
12n.	Suitable battery size (Inner size)	180*120*10mm

13. Final Sealing Machine For Pouch Cell- 1 No		
		<b>Make to be Mentioned</b>
		<b>Model to be Mentioned</b>
13a.	Feature	· Head made of copper material
		· The upper and lower head pressure can be adjusted through the regulator to achieve different process parameters
		· Upper and lower head with cylinder driven by two linear guide sleeve guide, up and down flexible, accurate guidance to ensure product parallelism after sealing requirements;
		· With automatic puncturing function, waste recovery unit;
		· Cover cavity driven by the cylinder, guided by a linear guide sleeve, up and down flexible, accurate guide to ensure product sealing requirements;
		· Can be applied to different specifications of the product battery, and the adjustment is simple and convenient;
		· Easy to operate, beautiful appearance, small size, light weight;
13b.	Cavity	Cavity made of aluminium alloy, corrosion-resistant, solid structure;
13c.	Vacuum	-90 Kpa ~ 0 adjustable
13d.	Head temperature:	RT ~ 250 °C, temperature adjustable
13e.	Temperature control accuracy	± 1.5 °C or better
13f.	Heat sealing pressure	0 ~ 7Kg / cm2 adjustable
13g.	Sealing time	0 ~ 100 seconds adjustable
13h.	Edge width	5mm
13i.	maximum edge size	200mm
13j.	Head parallelism	with triple carbonless paper, head pressure at 0.6MPa, the temperature at 200 °C when the seal out of the seal

13k.	Air consumption	about 0.2L compressed gas
13l.	Pneumatic working speed	≥ 180 times / h
13m.	Compressed air source	0.5 ~ 0.7Mpa
<b>14. Top-Side Sealing Machine For Pouch Cell – 1 No</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
14a.	Power	600W
14b.	Compressed air	≥ 6 kg/cm <sup>2</sup>
14c.	Suitable battery size	Top sealing ≤ 200mm, Side sealing ≤ 200mm
14d.	Sealing head length	200 mm, Customized
14e.	Sealing Thickness accuracy	0.015 mm or better
14f.	Sealing thickness	0.06 - 0.3 mm
14g.	Sealing stamp width	6 mm
14h.	Sealing pressure	0.5- 0.7 MPa (0 - 99 psi) adjustable
14i.	Sealing temperature	RT-250 Degree C, adjustable with controlling accuracy +/-2 °C
14j.	Sealing time	0-99s adjustable
14k.	Sealing blade type	Soft sealing blade (Copper sealing blade with aluminum and Silicone rubber piece, good for Al film case sealing and case with tab in between, suitable for both top sealing and side sealing)
<b>15. Semi-Automatic Electrode Slitting Machine – 1 No</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
15a.	Feature	· Slitting speed is adjustable.
		· Protection cover is designed for safety operation.
		· The die total width 300mm, slitting width can be made according to requirement.
		· Slitting no burr, no powder drop.

		· Application Lithium Ion battery & Super Capacitor
		· Cutting Blade Material Tungsten Alloy.
15b.	Slitting Width	20 ~300mm (according to requirement)
15c.	Slitting Thickness	80 ~ 300μm
15d.	Cutting Width	20-300 mm
15e.	Copper and Aluminium foils. Slitting Widths	34 mm & 45 mm in One Slitting Die
15f.	Slitting Burr	≤ 25 μm
15g.	Slitting Speed	Max 4m/min, it is adjustable
<b>16. Semi-Automatic Electrode Winding Machine– 1 No</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
16a.	Winding Speed	0 - 170 RPM Adjustable
16b.	Winding Shaft	Dimensions: 4mm(OD) x 65mm(L) for 18650 cylinder battery core
		Suitable shaft for other sizes like 26650, 21700 and 32650 & customizable in future for different battery model
16c.	Winding Mode	Switchable between clockwise and counter clockwise Direction
16d.	Battery Format	Suitable for 18650, 26650, 21700 & 32650
<b>17. Semi-auto Grooving Machine – 1 No</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
17a.	Suitable for battery model	18650, 26650, 21700, 32650 can be customizable for future need
17b.	Grooving depth	1.2-2.0 mm adjustable
17c.	Grooving width	1.1-1.5 mm
17d.	Grooving precision	±0.1 mm or better
17e.	Knife life	>100 0000 times or better
17f.	Air supply	0.5-0.7 MPa

17g.	Die	Separate die for each battery model
<b>18. Hydraulic Crimping Machine for Cylindrical Cases – 1 No</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
18a.	Driving Force	Manual hydraulic pressing up to 5T
18b.	Pressure Gauge	0-3500 psi (0-250 kg/cm <sup>2</sup> )
18c.	Body	Stainless Steel
18d.	Crimping Dies	18650, 26650, 21700 & 32650
<b>19. Ultrasonic Welding Machine for Cylindrical Cell - 2 No</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
19a.	Features	Welding programs selectable for various metals Al, Au, Fe, Ni, Ag, Cu etc
19b.	Max. Power	2000W or higher with adjustable
19c.	Welding Area	· 4 mm (L) x 4 mm (W)
		· Welting area can be adjustable
19d.	Welding Head	· The welding heads and welding base are included for welding both aluminium & copper current collectors from 2 to 25 layers
		· Provide suitable welding head for other current collector
19e.	Ultrasonic Frequency	40KHz
19f.	Compliance	CE Certificate
<b>20. Electrolyte Filling &amp; Diffusion Machine for Cylindrical Cell – 1 No</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
		· One machine includes injection and diffusion functions;
		· High measurement accuracy and repeatability;
		· Injecting liquid after vacuuming, high efficiency, accuracy, convenient and reliable operation;

20a.	Feature	<ul style="list-style-type: none"> <li>· Injection accuracy<math>\pm</math>0.5%, injection volume 0.2 ml ~ 200 ml;</li> <li>· The entrance and exit are connected by chemical resistant hoses;</li> <li>· Can be operated in a glove box or dry room;</li> <li>· The performance is stable;</li> <li>· PLC, touch screen operation, flexible parameters, high automation program</li> </ul>
20b.	Function	Injection and Diffusion
20c.	Cylindrical range	$\Phi$ 60, H100mm or less, according to the 18650 calculation standard with 4 stations, 4 notes at a time
20d.	Range of capacity	0.2 ml ~ 200 ml
20e.	Core liquid injection	0.2 g ~200 g
20f.	Injection accuracy	$\pm$ 0.5% or better
20g.	Exhalation velocity	6 ml/s adjustable
20h.	In and out pipe	The liquid inlet pipe 6
20i.	Adjustable stroke	Maximum X-axis stroke 0~80 mm (center)
20j.	Material	Manufacture of stainless Steel 304 and 316 corrosion-resistant material in key parts
20k.	Other Req.	Should be place in Glove Box, it should be compact & compatible with Glove box
<b>21. Double Pulse Spot Welder – 1 Nos</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
21a.	Control	pneumatic
21b.	Welding current	3000 A or higher
21c.	Welding energy	0-99%
21d.	Welding pulse	double pulse
21e.	Welding power	15KVA or higher
21f.	Accessories	Needle-5 Nos



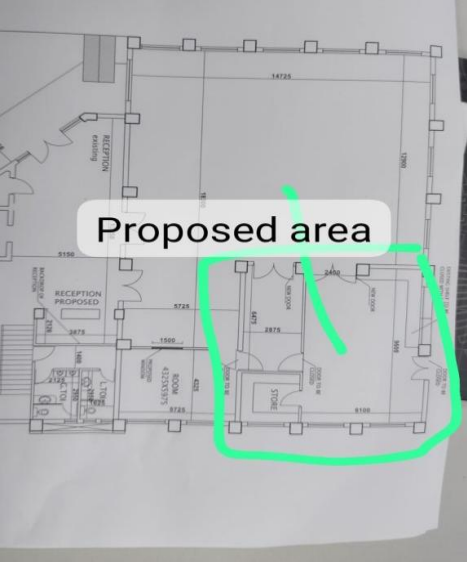
<b>22. Coin Cell Punching Machine – 1 No</b>		
		<b>Make to be Mentioned</b>
		<b>Model to be Mentioned</b>
22a.	Punching size	φ14mm,16 mm & 19 mm punching die,
22b.		For make CR2016, CR2025 or/and CR2032 coin cell batteries, need at least three cutting dies:
		· A 14mm (for cutting negative electrode)
		· B 16mm (for cutting positive electrode)
		· C 19 mm (for separator to fully separate the electrodes)
		Optional Die CR2450 coin cell:
		· A 18 mm die for cutting negative electrode
		· B 20 mm die for cutting positive electrode
· C 23 mm cutting die for either electrode or separator disc.		
22c.	Punching stroke	25 mm
22d.	Punching thickness	0.005-0.5 mm electrode and separator
22e.	Other req.	Simple operation Light weight, Can cut electrode and separator
<b>23. Hydraulic Coin Cell Crimping Machine- 1 No</b>		
		<b>Make to be Mentioned</b>
		<b>Model to be Mentioned</b>
23a.	Standard Crimping Die	· One set of crimping die for CR2032,CR2025,and CR2016
		· PTFE Anti-Corrosion Core prevents coin cells from being short circuited
23b.	Advantages	· The lower die with high precision positioning ring spacing, control battery seal height
		· The upper die is provided with a sealing cup inner screw spring mechanism, ensure in case the battery sealing clamp cannot be removed, only the top screw clockwise and the button battery out.
		· By using aluminium alloy and high strength steel,surface after the environmental protection electroplating processing will never rust
23c.	Rocker Pressure	< 6 kg/cm <sup>2</sup>
23d.	Max Pressure	200 kg/cm <sup>2</sup> (The hydraulic drive pressure up to 8T, the battery sealing no vibration, no leakage)
23e.	Working Pressure	80-100 kg/cm <sup>2</sup>

23f.	De-crimping Die	Should separately Die for De- crimping of CR2032
<b>24. Dry Room - ISO Class 8 For Lithium Ion Battery Fabrication</b>		
<b>Make to be Mentioned</b>		
<b>Model to be Mentioned</b>		
24a.	Feature	Air Changes - 20 ACPH Temperature - 24 ± 2 Degree C & RH Less Than 25%
		Dry room should be as per ISO Class 8
24b.	Dry room Size	350 Square Feet
24c.	Air Handling Unit - For ISO Class 8	Double Skin AHU complete with mixing box, section, pre-filter section, Fine Filter, HEPA Filter, fan, Cooling Coil, volume control dampers for Supply Supply AHU capacity: 2500 CFM or more @100 mm SP / 8.5 Tr ( Blue Star/ Carrier) or equivalent Condensing Unit - 8.5 TR Expansion valve & drier etc Copper Tubing AHU Control Panel
24d.	Ducting	· Air Distribution-Ducting: Supply and installation of Ducting made out GI sheet with proper gaskets, supports, angle frames, rods etc and fabricated as per ISI standards · 24 G G.I Duct with angle support
24e.	Insulation	· Insulation material with Nitrile foam/cross linked Polyethylene material outer and adhesive will be used · Thickness of duct: 9 mm or better
24f.	Supply air & Return air Diffusers	Supply as per ISO 8
24g.	Dampers	Galvanized steel Volume controlled damper, Opposed / parallel Blade Dampers are used to carry out a rough air system balance with closer control being carried out at the individual grilles or diffusers.
24h.	M. Gauge	Suitable gauges need to be supply

24i.	Ceiling Panel	· Supplies of modular clean room 50 mm thick ceiling panel both side PCGI. PCGI filled with PUF quality 40 kg/m3 density with 0.6 mm thick sheet.
		· T grid with all accessories etc.,
24j.	Wall Panel	· Supplies of modular clean room 50 mm thick wall panel both side PCGI. PCGI filled with PUF quality 40 kg/m3 density with 0.6 mm thick sheet.
		· All accessories including C track, channels etc.,
24k.	Coving	· Extruded Aluminum powder coated clip on type R 52 covings for the entire wall to wall and wall to ceiling
		· 3D corners
24l.	Modular Clean room Door	· Material: PCGI, Skin Thickness: 1mm, Infill : PUF with flush double glazing glass, hardware like door closure, D handles, ball bearing butt hinges and provision for concealed automatic door bottom seal
		· Size: 1200 x 2100 mm (Single door) Emergency & Material Entry
24m.	Epoxy Flooring :	· 3 mm thick Epoxy flooring
		· Epoxy Coving
24n.	Air Shower	· Inner dimension: 900 x 1200 x 1950 mm (W x D x H)
		· Overall dimension: 1400 x 1300 x 2600 mm (W x D x H)
		· Cabinet: CRCA Powder Coated
		· Platform: Vinyl floor, Double door with View glass, Electromagnet interlocking, Countdown timer etc
24n.	Rotor Type Dehumidifier	· 2000 CMH or More
		· Electrical work Internal Wiring including supply of LED Lights & Sockets reputed brands only
		· Air Compressor Line & Vacuum Line for the instruments need to include in the offer

25a.	Other	<ul style="list-style-type: none"> <li>· The dry room will be upgradable in feature for relative humidity of less than 5% without modifying the existing system</li> </ul>
25b.	Installation, Commissioning, Acceptance and other requirements	<ul style="list-style-type: none"> <li>· The layout for the dry room attached with this tender. For better understanding the venders are invited for site before participating the tender.</li> </ul>
		<ul style="list-style-type: none"> <li>· Installation &amp; Commissioning should be carried out at CIPET, Bhubaneswar at free of cost.</li> <li>· Pre-installation requirements which need to be arranged by CIPET should be furnished along with the technical bid.</li> <li>· Requirements of space, electricity, and other auxiliaries/utilities (e.g., gas lines, water, chiller, solvent sources, dehumidifiers, Air Conditioner, scrubbers etc., as applicable) for the equipment should be specified.</li> <li>· Please specify power requirement for the main facility and for the accessories.</li> </ul>
		<ul style="list-style-type: none"> <li>· All spares/accessories needed for the smooth operation for 3 years should be quoted in the tender</li> <li>· The following Items required for training and installation of battery fabrication facility.</li> </ul> <ol style="list-style-type: none"> <li>1. Thickness gauge, spilt cell for two and three electrodes, micropipette (0-10 <math>\mu</math>L, 0-20 <math>\mu</math>L, 0- 50 <math>\mu</math>L), Handheld Pouching Die (14 mm, 16 mm &amp; 19 mm) – each 1 Nos</li> <li>2. 316 Coincell R2032 with spacer -1000 Nos.</li> <li>3. Current Collector – Al, Cu - 3 Rolls; Ni mesh – 1 Roll</li> </ol>

25c.	Spares/accessories	<p>4. Cathode -Nickel Manganese Cobalt (NMC), Lithium Iron phosphate (LFP), Nickel Cobalt Aluminium (NCA) – each 1.5 Kg</p> <p>5. Anode- Graphite, carbon coated Si, Mesocarbon – each 1.5 Kg</p> <p>6. Binder – PVDF, PTFE – 1 Kg</p> <p>7. Solvent – NMP- 10 L</p> <p>8. Conductive additives – Super P conductive carbon black, Ketjenblack – 500 g</p> <p>9. Separator – Cellulose, PP – 3 rolls each</p> <p>10. Electrolyte- LiPF6, LiTFSI, LiBOB- 500 mL; Et<sub>4</sub>NBF<sub>4</sub> + AN – 250 mL</p> <p>11. Ni, Al Tabs – 10 box</p> <p>12. Al, Ni Strips – 2 roll each</p> <p>13. High purity (99.99%) lithium chip – 1 bottle</p> <p>14. Cylindrical cell cases (18650, 26650, 21700 &amp; 32650) – 200 Nos</p> <p>15. Aluminium Laminated Film For Pouch Cell Case – 3 roll (4 Meter Each Roll)</p> <p>16. Activated Carbon For Water System Super capacitors – 500 g</p>
25d.	Warranty (Onsite)	<p>· The entire equipment should be Warranted for a period of 2 years from the date of acceptance of successful installation and commissioning.</p>
25e.	Qualification Criteria & Other Aspects	<p>· The vendor should have supplied similar 4-5 systems for LIB Pouch /Cylindrical Cell Fabrication &amp; Dry Room for LIB Fabrication with same or better specifications to Indian institutes of national repute or Indian Industries and details should be furnished with proof &amp; PO Copy.</p> <p>· Photographs and catalogues related to machine should be enclosed in the offer</p> <p>· Dimensions of equipment, weight and space requirements should be submitted in technical offer.</p>

		<p>Details of facilities/supporting equipment's/consumables required for trouble free operation shall be furnished in the technical bid.</p>
25f.	Training	<p>Onsite training should be provided for the system operation and maintenance free of cost by engineers of OEM for at least 4-5 days working days.</p>
25g	Compliance Statement	<p>Compliance statement of specification to be submitted with offered specifications mentioned against CIPET required specification along with the technical bid. The reference page number of brochure/catalogue/document submitted for each technical point may be mentioned in the compliance statement. Deviations if any should be clearly mentioned. Specification claims without supporting documents will not be considered for technical evaluation.</p>
25h.	Site information	

2. ANAEROBIC BIODEGRADATION APPARATUS		
Sl. No.	Specification	Range / Value
1	Conforming to standards	IS/ISO 15985, IS/ISO 14853, ASTM D 5511
2	Incubator or Waterbath	Maximum temperature: Upto 70°C
		Accuracy: ± 1°C
		Capable of maintaining 52±2°C

		Capable of accommodating 24 nos. of Digestion vessels
3	Digestion Vessel	Conical or other suitable glass flasks – No loss of gas should occur
		Volume: Min. 750 mL – Min. 12 Nos. each
		The Digestion Vessel should be equipped with in-situ gas absorption attachment (GAA) units placed above the headspace of the reactor.
4	Gas Volume measurement System	· An inverted graduated cylinder or plastic column in water or another suitable device for measuring gas volume
		· The gas volume measuring device, as well as the gas tubing, shall be of sufficient quality to prevent gas migration and diffusion between the system and the surrounding air
5	Gas Analyzer	· Equipped with suitable detector for measuring the methane and oxygen / Air demand/consumed concentration in the evolved gases
		· Required Oxygen / Air storage bags / Cylinders
6	Connecting tubes	Suitable for leak proof connection between Digestion vessel and gas measuring system
7	Gas removal Unit	Ex situ Gas trap bottles – Min. 12 Nos.
		In situ Gas trap attachment units Min. 12 Nos.
		Capacity: 100 mL
8	Flow Meter Array Unit	For min. 12 Vessels
		Range: 5 to 100 mL/min
		Measurement Resolution: Atleast 10 mL or better
		Data Storage: Locally. Storage up to 50 L of gas per Flow Meter at once or better
9	Stirrer	Motor-driven agitators Min. 12 Nos. each for both Ex situ & In situ Digestion Vessel units.

10	Software	User friendly software for complete measurement and data storage
		Gas flow analysis
		Volumetric measurement of oxygen / Air demand/consumed and Methane gases.
		Time to time updation in software, if any should be upgraded.
11	Computer	Computer with suitable configuration with printer should be provided.
12	Accessories	Any other accessories required for smooth operation of the equipment should be quoted
13	Warranty	Minimum two years of warranty
14	Training	Training should be provided onsite for atleast 05 members
15	Manual	User Manual Guide – Both hard and soft copy to be provided.
16	Service	Service person should be made available within 48 hrs of complaint.
17	Installation and Commissioning	The Machines should come with all other essential accessories & spares required for installation, commissioning & operation.
18	Scope of supply	Complete list of items quoted are to be provided



### 3. BLACK BODY (35°C to 500°C)

Sl. No.	Specification	Range / Value
1	Type	Portable; for onsite calibration
2	Temperature Range	35 °C to 500 °C or higher
3	Accuracy	± 0.35 <sup>0</sup> C or better at 35 <sup>0</sup> C
		± 0.50 <sup>0</sup> C or better at 100 <sup>0</sup> C
		± 0.75 <sup>0</sup> C or better at 200 <sup>0</sup> C
		± 1.50 <sup>0</sup> C or better at 350 <sup>0</sup> C
		± 2.0 <sup>0</sup> C or better at 500 <sup>0</sup> C
4	Stability	± 0.1 <sup>0</sup> C or better at 35 <sup>0</sup> C
		± 0.30 <sup>0</sup> C or better at 200 <sup>0</sup> C
		± 0.50 <sup>0</sup> C or better at 500 <sup>0</sup> C
5	Uniformity (5.0 in dia of center of target)	± 0.20 <sup>0</sup> C or better at 35 <sup>0</sup> C
		± 0.70 <sup>0</sup> C or better at 200 <sup>0</sup> C
		± 1.50 <sup>0</sup> C or better at 500 <sup>0</sup> C
		± 0.20 <sup>0</sup> C or better at 35 <sup>0</sup> C

6	Uniformity (2.0 in dia of center of target)	± 0.3 <sup>0</sup> C or better at 200 <sup>0</sup> C
		± 0.70 <sup>0</sup> C or better at 500 <sup>0</sup> C
7	Heating Time	60 min: 35 <sup>0</sup> C to 500 <sup>0</sup> C or better
8	Stabilization time	15 minutes or better
9	Nominal emissivity	0.95 or better
10	Thermometer Emissivity Compensation	0.9 to 1.0 or better
11	Target Diameter	152.4 mm (6 in) or better
12	Power	94–234 VAC (±10 %), 50/60 Hz
13	Computer Interface	RS-232 included with free Interface-it software
14	calibration certificate	Traceability certificate should be provided from national and international accredited body
15	Accessories to be quoted and supplied along with machine / equipments:	Carrying Case
16	Training	Required training should be provided on operation and maintainance
		Complete set of manuals for the operation of equipment should be given.
17	Scope of supply	Complete list of items quoted are to be provided

18	Intallation & Commissioning	The Machine should come with all other essential accessories & spares required for installation, commissioning & operation.
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#### 4. FORCE PROVING RINGS

Sl. No.	Specification	Range / Value
1	Purpose	It is used to calibrate the compression & Tension Force
2	Loading pattern	Compression & Tension
3	Capacity	100 N, 2 kN, 20 kN, 200 kN,
4	Display type	High Resolution Colour Touch LCD or better
5	Class	1 or better
6	Reproducibility	0.2% or better
7	Repeatability	0.1% or better
8	Error of interpolation	± 0.1% or better
9	Hysteresis	0.3% or better
10	Creep (in 30 minutes)	0.1% or better
11	Zero Return	± 0.05% or better
12	Nominal emissivity <sup>3</sup>	0.95 or better
13	Display Resolution	For 2 kN, 20kN : - 0.0001kN or better For 200kN: - 0.01kN or better
14	Measurement Units	N, kN, kgf, lbf or better

15	Mode of Operation	Trace, Peak, Auto Peak or better
16	Plug and Play Sensors (No. of Sensors)	7 or better
17	Data Storage & Logging	Upto 9999 as Calibration Reports or better
18	Calibration Sequence and Report Capture as per ISO 7500-1	Automated Sequence to ensure data credibility
19	Data Transfer Options	USB-PC or Pendrive
20	Operating Temperature	-7.6 10 °CVDC, to +65°C or better
21	Construction	Aluminium or better
22	calibration certificate	Traceability certificate will be provided from National and international body
23	Accessories	Carrying Case
24	Training	Required training should be provided on operation and maintainance
		Complete set of manuals for the operation of equipment should be given.
25	Scope of supply	Complete list of items quoted are to be provided
26	Intallation & Commissioning	The Machine should come with all other essential accessories & spares required for installation, commissioning & operation.

5. Universal Testing Machine (10 kN)		
Sl. No.	Specification	Range / Value
1	Max. load capacity	10 kN
2	Load cell	10 kN, 1.0 kN and 100 N
3	Load cell accuracy	≤ 0.5% or better
4	Test speed	0.1 mm/min to 500 mm/min.
5	Speed accuracy	± 0.2% or better

6	Cross head travel	Min 800 mm or better
7	Horizontal daylight	Min 400 mm or better
8	Strain measurement accuracy	0.5% or better
9	Load measured	Tension, bending and Compression
10	Grips & Fixtures	All the Fixtures such as Tensile grips, mechanical wedge grips, roller grips, pneumatic vice grips should suitable for low and high temperature testing and can be accommodated into environmental chamber.
10.1	Grips & Fixtures for 10 KN Load Cell	<b>Suitable Pneumatic grip</b> for plastics samples (test specimen-filament, films and fibre)
		· Tensile ASTM D638, ASTM D 882, ASTM D 412, ISO 527- Suitable for Flat Sample thickness 1mm to 20mm
		· Tensile Grip IS 1969 for woven sacks (50 mm width)
		<b>Manual Wedge grip up to 10KN</b>
		· Tensile ASTM D638, ASTM D 3039, ISO 527- Suitable for Flat Sample thickness 1mm to 20mm
		· Compression test fixture complying to ASTM D 695
		· Flexural - three-point bend and four-point test fixture complying to ASTM D 790, ISO 178 with adjustable span 10 mm -300 mm or equivalent. Interchangeable option for anvils, rollers and supports
		· Fixtures for 180° peel as per ASTM D 3330 Fixture for shear as per ASTM D 732
		· Roller grips for Belt ASTM D 3950
		<b>Pneumatic grip (for Film, rubber, fiber/filament)</b>

10.2	Grips & Fixtures for 1KN Load Cell	· Tensile ASTM D882- Suitable for Flat Sample thickness 10 micron to 5 mm and Width 25 mm
		<b>Manual Wedge grip</b>
		· Tensile testing of Yarns and Threads (confirms to ASTM D 2256) MPCF type grips
		· Tensile ASTM D882- Suitable for Flat Sample thickness 10 micron to 5 mm and Width 25 mm
		· Flexural - three point bending and four point bending fixtures complying to ASTM D 790 with adjustable span 10 mm -300 mm or equivalent. Interchangeable option for anvils, rollers and supports
		· Short beam test fixture as per ASTM D 2344
		· Fixtures for 180° peel as per ASTM D 3330
10.3	Grips & Fixtures for 100 N Load Cell	· Pneumatic grip (for Flim,rubber, fibre/filament)
		· Tensile testing of Yarns and Threads (confirms to ASTM D 2256) MPCF type grips
		· Tensile ASTM D882- Suitable for Flat Sample thickness 10 micron to 5 mm and Width 25 mm
11	Extensometer	Laser / Any other non-contact method
		Capable for use under ambient conditions as well as elevated and sub-zero temperature inside environmental chamber
		Vertical travel - 600 mm or better
		Resolution - 0.02 mm or better
		Accuracy - 1% on 25 mm & 50 mm gauge length
		Contact extensometer suitable for measuring elongation, young's modulus and Poisson's ratio (provision for keeping the extensometer within the machine when not in use)
12	<b>Environmental Chamber</b>	
	Operation Temperature range	-70 to +300 °C or better
	Accuracy	1 °C cover the entire range

12	Ramp Rate	15 °C/min or better
	Chamber Dimension	Suitable for elastomeric samples
	Cooling Medium	Liquid Nitrogen (Dewar Flask of 25 to 50 L capacity to be provided with required accessories)
13	Operating system & Software	Suitable for all functions such as maximum load, strain, modulus etc. Necessary software, Computer & Printer should be provided.
14	Installation and Commissioning	The Machines should come with all other essential accessories & spares (as per ASTM & ISO standards) required for installation, commissioning & operation.
15	Scope of supply	Complete list of items quoted are to be provided
16	Training	Training on operation & maintenance of the equipment should be provided onsite for 3 days

6. UV - Vis - NIR Spectrophotometer		
Sl. No.	Specification	Range / Value
1	Photometric system	Double beam optics
2	Monochromator	Double beam monochromator
3	Light Source	Deuterium lamp, WI lamp with automatic optical axis adjustment
4	Detectors	PMT, Pbs and or InGaS.
5	Wavelength Range	200 or lower to 3300 nm
6	Wavelength Accuracy	± 0.2 nm or lower for UV/Vis
		NIR: ± 0.8 nm or lower
7	Resolution	± 0.08 nm or better for UVVIS. +/-0.32nm or better for NIR
8	Wavelength scanning speed	Wavelength scanning speed: Instrument have variable wavelength scan rate max. 2000 (UV-Vis) and max. 8000 nm/min or better (NIR) with automatic selection.

9	Spectral band width	UV/VIS: 0.1 -5 nm or broader with Continuous variable bandwidth in steps
		NIR : 0.2 -20 nm or broader with Continuous variable bandwidth in steps
10	Stray light	0.00008 %T or less (220 nm; NaI)
		0.00007 % T or less (340/370 nm, NaNO <sub>2</sub> )
		0.0005 %T or less (1420 nm, H <sub>2</sub> O)
		0.0005 %T or less (2365 nm, CHCl <sub>3</sub> )
11	Photometric range	Photometric range of 6 Abs or better
		Transmittance and reflectance -0 to 100% or better
12	Photometric Accuracy	Instrument should have photometric accuracy of 0.002 Abs at 0.3/0.5Abs
13	Photometric repeatability	0.0008 Abs (0 - 0.5A)
		0.0016 Abs (0.5 - 1A) or better.
14	Baseline Flatness	0.001 Abs (200-3000nm) or higher
15	Baseline stability:	Within 0.0002 Abs/h
		(500 nm, 1-second integration)
16	Noise Level	UV-Vis: 0.00005 Abs or less (500 nm)
		0.00003 Abs or less (1500 nm)
17	Data Acquisition	The equipment should interface with computer and controlled by software. Data points in .csv format to be obtained.
<b>Accessories to be quoted and supplied along with machine / equipment</b>		
1 10 mm rectangular quartz cell - 02 pair		
2. 100 mm cylindrical quartz cell - 02 pair		



18	3. Film Holder - 01 no.
	<p>A. Solid sample transmission holder: 1 Nos. solid sample transmission holder for thin film/solid samples.</p> <p>B. Solid powder sample holder: - 1 Nos.</p> <p>C. Quartz Cuvette: pair of quartz cell of 3 mL capacity and 10mm path length for liquid sample</p> <p>D. Beam Adjustable holder – Beam size (height/width) fully software Controllable for small sample measurement</p> <p>E. Relevant accessories for analysis of high absorbing samples and should be software controllable</p> <p>F. Desktop: suitable branded PC with i5 processor with 8 GB RAM, Hard Disk 1 TB, 24 inch monitor and color printer (Ink Tank) with Scanner, Anti –virus software or better configuration</p> <p>G. UPS: 5KVA or suitable capacity UPS with minimum 30 minutes backup or above</p>
	The total instrument must have warranty of 2 years from the date of installation
	<p>Integrating sphere accessory with facility to measure</p> <p>Reflectance Accessories : minimum 150 mm dia integrating sphere (PMT and PbS detector and or InGas) to measure 200-2500 nm or better with powder sample holder, transmission holder for thin film and cuvette holder.</p>
	CRM - NIST Traceable Pressed Barium Sulphate

7. Micro injection moulding Machine			
Sl. No.	Specification	Unit	Range / Value
<b>Injection Unit</b>			
1	Stroke volume	cm <sup>3</sup>	up to 12.5
2	Machine Design		Piston based injection molding system
3	Shot weight	g	3.5 & above
4	Injection & holding Pressure	bar	1000 & above
5	Drive plunger pressure	bar	1000 & above
6	Melt temperature	°c	Up to 450 Deg C
7	Mold Temperature	°c	Up to 250 Deg C
<b>Clamping Unit</b>			

8	Clamp Force, opening stroke, ejector pattern etc to be provided for the machine as per standard Construction as applicable	kN, mm	Injection force pressure: upto 1000 Bar & at 10 bar compressed air supply. Ejection tool should be Supplied.
<b>General</b>			
9	Main Controller		Micro processor Controls should be provided like HMI touch screen with Microprocessor/PLC control and digital display by PID controls also please mention the type of controller used/USB port for data copying
10	Electric or Pneumatic Drive	-	Electric or Pneumatic
11	Total connected Load	KW	1.5 or below
12	Set of Mould for Test specimen for Tensile, as per ASTM	-	Set of Mould for Test specimen for tensile as per ASTM D638, type V
13	Essential/Standard spares	-	Standard tools kit.
14	Warranty	-	2 Year
15	Compatibility	-	Micro-injection Molding Machine Should be compatible with Micro-compounder.

### 8. Pyrolysis Plant (Continuous Non - Catalytic Thermal Depolymerization Plant)

<b>A</b>	<p><b>Scope of Supply:</b> Design, Procurement, Engineering, and Supply of fully Continuous Non- Catalytic Thermal Depolymerization Plant that can handle 1000 Kg of Waste Plastics on a continuous feed in 24 hours and convert them into Oil, Gas, and Char. The char shall be continuously removed and cooled near to atmospheric temperature. The non-condensable gas should be supplied to gas engine to produce electricity. The tentative specifications are provided in subsequent sections. However, it is vendor's responsibility to supply a safe and sustainable system by including all other component and necessary spare parts for smooth running of the plant. The vendor must provide complete technical details of each component quoted under this unit.</p>
<b>B</b>	<p><b>Standards to be Followed:</b> ATEX (Explosion protection) certificate approved by TUV shall be provided. External HAZOP shall be conducted for each plant as part of the engineering. Safety Integrity Level for safety-relevant loops, Control philosophy with a safety focus implemented by control logic, automated safety routines, interlocks, and set points for alarm and warning triggers shall be provided. The plant automatically reaches safe mode if required, independent of operator action.</p>

C	<b>Safety standards to be followed:</b> IEC 61508: Functional Safety of Electrical / Electronic / programmable electronic safety related system IEC 61511: Functional safety - Safety instrumented systems for the process industry sector IEC 62061: Safety of machinery: Functional safety of electrical, electronic and programmable electronic control systems	
Sl. No.	Parameters of the Unit	Specification
1	Waste plastics Thermal Depolymerization unit with set of accessories for recovery of Fuel Oil, Produced gases and Solid materials	Thermal Depolymerization with the environmentally friendly closed-loop thermal breaking reaction of the high molecular weight plastics in an oxygen- free environment, producing low molecular weight molecules. (a) Quantity: 01 (b) Capacity of 1000 kg per day oncontinuous Basis (c) Non-Catalytic Process (d) Electrically Heated
2	Applications	(a) Production of quality Fuel Oil (b) Unit should capable of handling Multi- Layer Waste Plastics with aluminum, carry bags, mixed plastic scrap, laminates, packing material waste, multilayered plastic etc. (c) Recover produced gases and solid residue i.e., charcoal of high quality
3	Output	The plant should have system to separate liquids with two different boiling points. Char must me cooled and removed continuously. Producer Gas
4	Waste Plastic Shredder	Shredder should reduce the size of the waste plastics and make it uniform for proper feeding with a capacity of 150 kg per hour.
5	Buffer Silo	The uniform feedstock should be stored in a silo size 1.5 m3. MOC: IS2062 Gr. A with agitator connected to a drive and motor
6	Transport conveyor	The transport conveyor transfers the feedstock from Silo to the feeding unit. The conveyor should be a screw conveyor, “U” trough with a transparent lid to view the material movement.
7	Feed Stuffing screw	The feed screw with a electric heater to partially melt and feed into reactor in an airtight manner. MOC: Special alloy Material A335 or better.
8	Core Reactor	In the reactor, Polymer waste is heated up to 500 deg C to crack the polymer chains to short chain and char. MOC: SS304

9	Reactor heating system	<p>a) Electrically heated furnace Temperature: Working temperature up to 500 °C</p> <p>b) Temperature should be uniform throughout the reactor and Temperature accuracy: + 5 °C.</p> <p>c) The reactor should be fitted with external heaters and a pocket heater should be installed to provide uniform heating.</p>
10	Char Removal Screw	Water jacketed screw conveyor, which removes the char from the reactor, cools down and transported to a collection bin
11	Stepped Condensation	Several boiling points of the condensable vapour are collected as wax, Petrol Range of Hydrocarbons and Diesel Range of Hydrocarbons. The system should have re-boilers, distillation columns and tube and shell heat exchangers and oil receivers.
12	Cooling system	In order to successfully separate low-boiling components, low cooling water flow temperatures can be provided by an active cooling system (compression chiller) at ambient temperature.
13	Emergency torch	Very short chain products (permanent gases should be burnt without damage in an emergency torch if they can't be used on site to generate electricity or heat
14	Monitoring	<p>a. Level Monitoring in Input Material storage, Output Material Storage</p> <p>b. Temperature Monitoring in Complete Process</p> <p>c. Flow Measurement of Produced Oil &amp; Gas</p> <p>d. Input Feed status</p>
15	Control System	Web-based SCADA for Monitoring & Control of Total Unit with Multiple Alert with DAQ system
16	Communication	Data Communication standards meet DLMS Protocol with IEC 61850 Facility
17	Housing	The entire system should be skid-mounted and can fit into a 20 feet container
18	Operating Power	415 VAC 3 Phase, 50hz
19	Diesel Generator	25kva Generator attached with the Unit

20	Pre-installation requirements	<p>a) Bidder should provide all technical drawings related to the plant and prefabricated shed design required for plant installation.</p> <p>(b) Plant installation requirements (electricity, water, construction structure etc.) should be provided accurately.</p> <p>(c) The bidder shall have one R&amp;D consultant from any CFTIs for technological input and pre-installation test whose credentials shall be provided during quotation.</p> <p>(d) The product characterization results must be verified from any CFTIs lab.</p>
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