e-Tender Document for

Supply and Installation of *Machineries /* Equipment

at

CIPET:SARP-LARPM, Bhubaneswar





LAST DATE FOR SUBMISSION OF BID: 18.09.2019

SCHOOL FOR ADVANCED RESEARCH IN POLYMERS (SARP) - LARPM CENTRAL INSTITUTE OF PLASTICS ENGINEERING & TECHNOLOGY (Ministry of Chemicals & Fertilizer, Govt. of India) B-25, C.N.I. Complex, Patia, Bhubaneswar – 751 024 (Odisha) Tel: 0674-2740173, Fax : 0674-2740463, Web: cipet.gov.in, e-mail : larpmcipet@larpm.in



e-TENDER NOTICE (02/2019-20)

CIPET:SARP-LARPM, Bhubaneswar invites bids through e-Tender **UNDER SINGLE STAGE TWO BIDSYSTEM IN e-TENDER PORTAL (www.tenderwizard.com/CIPET)** from Reputed Suppliers/ Manufacturers / Authorized Dealer & Distributors having valid PAN, IT Return & GST Registration Certificate for supply & installation of the following equipment at CIPET:SARP-LARPM, Bhubaneswar. Bid offers should be of two parts viz., Technical Bid & Commercial Bid.

SI. No.	Name of the Equipments	Tender No.
1.	Thermal evaporator System	
2.	Ultrasonicator	
3.	Dielectric strength	02/2010 20
4.	Surface volume resistivity Tester	02/2019-20
5.	Viscometer	
6.	Dry blend <mark>er/High</mark> speed mixture	

Bidders are requested to visit the web-site www.tenderwizard.com/CIPET or www.cipet.gov.in and submit their offers electronically. It may be noted that offers submitted on paper manually or the offers sent by post shall not be entertained. The last date for submission of the bid is as mentioned below:

Last date for the online submission of the bid : 18.09.2019, 03.00 P.M.

Opening of Technical bid

19.09.2019, 03.30 P.M.

Opening of Commercial bid

: After Evaluation of Technical Bid

For further clarification, please contact no. 0674-2740173

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CIPET:SARP-LARPM reserves the absolute right to accept/reject any or all bids at any stage of the tender process without assigning any reason whatsoever.

Officer (PAF), CIPET:SARP-LARPM

INSTRUCTIONS TO BIDDERS

(A) Introduction

School for Advanced in Research (SARP) - LARPM is an exclusive R&D wing of CIPET functioning at Bhubaneswar. SARP-LARPM was set up with an objective of developing high-end polymeric materials for various engineering applications in the areas of packaging, automotives, aerospace, defence, biomedical, energy storage etc. The laboratory has high-end characterization facility and basic amenities under one roof, for Researchers and Intellectuals working in the areas of Polymer Science & Technology. The laboratory is also recognized by National Accreditation Board for Testing and Calibration Laboratories (NABL) as per ISO:IEC 17025:2005 and DST / DSIR, Govt. of India for undertaking Research Activities in applied areas of Polymer Science & Technology.

(B) The Bidding Documents

- Content of Bidding Documents
 - The Bidding Documents include;
 - (a) Instruction to Bidders;
 - (b) Terms and Conditions of Contract;
 - (c) Schedule of Requirements;
 - (d) Technical Specifications & Compliance Sheets;
 - (e) Manufacturer's Authorization Form;
 - (f) Bid Form and Price Schedules;
 - (g) Contract Form;
 - (h) Performance Security Form;
 - (i) Deviation Statement;
- The Bidder is expected to examine all instructions, forms, terms and specifications in the Bidding Documents. Failure to furnish all information required by the Bidding Documents or submission of a bid not substantially responsive to the Bidding Documents inevery respect will be at the Bidder's risk and may result in rejection of the bid.
- Amendment of Bidding Documents:
 - At any time prior to the deadline for submission of bids, the Purchaser may, for any reason, whether at their own initiative or in response to a clarification requested by a prospective bidder, modify the Bidding Documents by amendment.
 - In order to afford prospective Bidders reasonable time in which to take the amendment into account in preparing their bid, the Purchaser may, at their discretion, extend the deadline for the submission of bids

(C) Eligible Criteria for Bidders :

- Audited Balance sheet for the last 3 years
- Up-to-date IT return for the last 3 years, PAN Card, GST Registration Certificate.
- The Bidders must have satisfactorily supplied & completed installation of similar type of Instrument at-least 02 nos. in any Govt. Organisations/PSU/Corporate Sectors during the last 5 years. The Certificate in support of that from the user must be attached. The Customer Feed Back Certificate must be enclosed.

- Self declaration on **NO PENDING LITIGATION.**
- The vendor shall have local service and application office and infrastructure to attend visit within 48 hours.
- The vendor should furnish details of customers in India.
- The bidders shall give a list of his relatives working with the CIPET along with their designations and addresses.

(D) Terms&Conditions :

- Taxes :All taxes, duties, packing, forwarding& installation have been included in the quoted rate. GST should be charged 5% only, since CIPET is having DSIR certificate.
- **Performance Security**: 10% of the Purchase Order value shall be submitted by the party towards performance security within 7 days of receipt of Purchase Order in the form of Demand Draft. The Performance Security will be refunded after warranty period is over.
- **Warranty** :The Instrument should be covered under 1 year warranty from the date of installation and commissioning.
- **Delivery Period:**Supplier should be delivered the instrument within 08-10weeks from the date of receipt of Purchase Order, failing which liquidated damage @ 0.5% per week shall be deducted from the final payment, for each week of delay beyond the delivery period upto maximum of 2%.
- **Payment** :90% after supply of Instrument & balance 10% after successful installation, commissioning & Training as per our Technical Specifications & subject to fulfilment of other terms & conditions of the e-Tender documents.
- The Bidder shall provide the Bank accounts details along with Scanned copy of cancelled cheque for onward transaction.
- The vendor should have technical support in the area of application and service available within the country.
- In case of any up-gradation of software then the same should be provided free of cost by the supplier/manufacturer.
- Power and receptacle/socket as per Indian Standards should be provided.
- Appropriate tool box/kit for routine maintenance should be provided with the equipment
- On-site (at SARP-LARPM, Bhubaneswar) installation, demonstration and training for system operation and maintenance as well as application support should be provided by the vendor at its own cost.
- Tenders should specify & provide all mandatory and other accessories required for installation, commissioning and running the machine.

- The repairing/rectification/replacement/configuration required, if any, of the items under warranty must be done at CIPET:SARP-LARPM, Bhubaneswar by the bidder.
- The Annual Maintenance Charges (AMC) 3 Years should be quoted separately (Optional), which should not be quoted in the Price Bid.
- The supplier should mention the model & make against the Instrument.
- **Spares:** The supplier must confirm in writing that the spares for the instrument will be available for a period of at least 05 (Five) years after the Instrument supplied.
- **Bid document:** The vendor should read the e-Tender documents carefully before quoting. It shall be deemed that the vendor has gone through the documents carefully and has understood its implication.
- **Technical bid:** The Technical Bid should accompany with full technical literature, leaflets of the technical features of the Instrument must be submitted for evaluation.
- Declaration: The bidder should attach a self-declaration statement that he is not debarred/ blacklisted or banned from any Central Government / PSU / State Govt / any Corporate Sector.
- Manual:Complete set of service manual for diagnostics, trouble shooting and maintenance along with electronic circuit diagram (in English) – hard and soft copy should be provided with the instrument
- The e-Tender, submitted by the Bidder who have already been declared as Black Listed or whose contract was terminated for dissatisfactory supply or who was unable to supply any Institute/Organization run by the State / Central Government / PSU / Corporate Sectors will not be considered even his being the lowest rate.
- The Bidder should provide relevant documents regarding the Partnership Firm/Public/Pvt. Ltd. Company/Cooperative society.

Pre-Requisites

- Pre-installation requirements indicating details of power requirement, utility air, water, ventilation, safety device, if any, along with the foundation requirement needed for installation & commissioning should be provided prior to supply of Machine.
- Appropriate tool box/kit for routine maintenance should be provided with the equipment
- All documents (i.e. operating & service manuals, drawings etc.) and original softwares relevant to the instrument and its accessories must be supplied.
- Power and receptacle/socket as per Indian Standards should be provided.
- The vendor shall attend by visit within 48 hours of need.

Training

• Training at vendor site and onsite for system operation and maintenance as well as application support should be provided by the vendor at its own cost.

- Prices quoted should be on Delivered Duty Paid (DDP) basis to CIPET:SARP-LARPM, Bhubaneswar.
- Any legal disputes subject to Bhubaneswar, India jurisdiction only

• Delivery and Documents

(a) For Imported Goods

- Original and three copies of Supplier's invoice showing Goods description, quantity, unit price, total amount.
- Original and three copies of the negotiable clean, on –board bill of lading marked freight prepaid and three copies of non-negotiable bill of lading.
- > Five Copies of packing list identifying contents of each package.
- Insurance Certificate.
- > Manufacturer's /Supplier's guaranty certificate.
- > Traceable Calibration Certificate issued by Accredited Calibration agency and
- Certificate of Origin.

(b) For Domestic Goods:

Original and Three copies of:

- Copies of the Supplier invoice showing Goods description, quantity, unit price, total amount.
- Railway receipt /Acknowledgement of receipt of goods from the consignee(s);
- Manufacturer's /Supplier's guarantee Certificate;
- > Traceable Calibration Certificate issued by Accredited Calibration agency,
- Certificate of origin and
- Document evidence for GST Registration /Octroi etc., wherever applicable, bearing seal of office of issue indicating payments made extra.

The above documents shall be received by the Purchaser before arrival of the goods (expect where the goods have been delivered directly to the consignee with all documents) and if not received, the supplier will be responsible for any consequent expenses.

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Warranty/Guarantee

- The Supplier warrants that the Goods supplied under this Contract are new, unused, of the most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the Contract. The Supplier further warrants that the Goods supplied under this Contract shall have no defect arising from design, materials or workmanship (except insofar as the design or material is required by the Purchaser's Specifications) or from any act or omission of the supplier, that may develop under normal use of the supplied Goods in conditions obtaining in the country of final destination.
- This warranty/guarantee shall remain valid for 12 months after the Goods or any portion thereof as the case may be, have been delivered and Commissioned at the final destination indicated in the Contract.

- The Purchaser shall promptly notify the Supplier, in writing, of any claims arising under this warranty.
- Upon receipt of such notice, the Supplier shall, with all reasonable speed, repair or replace the defective Goods or parts thereof, without cost to the Purchaser.
- If the Supplier, having been notified, fails to remedy the defect(s) within a reasonable period, the Purchaser may proceed to take such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract.
- > The Supplier must provide the following warranties:
 - (a) The equipment proposed is Complete in every way
 - (b) The hardware/software specification, Capabilities and performance characteristics are as stated in the bidder's proposal and accompanying documentation.
 - (c) The supplier will offer to the Purchaser all technological updates, cost reductions and facilities, which are offered to other clients, in India, during the Contracttenure.

If the supplier is acting directly for the manufacturer of the Goods and Services, the Manufacture must honor these guarantee.

The MAINTENANCE SERVICE shall be as follows.

- (a) Free maintenance services shall be provided by the Supplier during the period of warranty.
- (b) The maximum response time for maintenance complaint from any of the destination specified in the Schedule of requirements (i.e. time required for supplier's maintenance engineer to report at the installation after a request call/email is made or letter is written) shall not exceed 24 hours.

• Liquidated Damages:-

If the Supplier fails to deliver any or all of the goods within the time period(s) specified in the Contract ,the Purchaser shall, without prejudice to its other remedies under the contract, deduct form the Contract Price, as liquidated damages, a sum equivalent @ 0.5% per week shall be deducted from the final payment, for each week of delay beyond the delivery period upto maximum of 2% of the delayed goods or services Contract price. Once the maximum is reached, the purchaser may consider termination of the contract

(E) Preparation of Bids

1. Bid Form

The Bidder shall complete the Bid Form and the appropriate Price Schedule furnished in the Bidding Documents, indicating for the goods to be supplied, a brief description of the Goods, their country of origin, quantity and prices

2. Agents and service facilities in India :

If a foreign bidder has engaged an Indian agent, it will be required to give the following details in the offer:

(i) The name and address of the local agent;

- (ii) What service the agent renders; and
- The amount of remuneration for the agent included in the offer (iii)

3. Documents establishing Bidder's Eligibility and Qualifications

- > The Bidder shall furnish, as part of its bid, documents establishing the bidder's eligibility to bid and its qualifications to perform the Contract if its bid is accepted.
- > The documentary evidence of the Bidder's qualifications to perform the Contract if its bid is accepted, shall establish to the Purchaser's satisfaction:
 - In the case of a Bidder offering to supply goods under the contract which the (a) Bidder did not manufacture or otherwise produce, the Bidder has been duly authorized by the goods manufacturer or producer to supply the goods in India.
 - In the case of a Bidder not doing business within India, the Bidder is or will be (b) (if successfully represented by an agent in India) equipped and able to carry out the Supplier's maintenance, repair and spare-parts stocking obligations prescribed by the Conditions of the Contract and / or Technical Specifications
 - (c) The Bidder has the financial, technical, and production capability necessary to perform the Contract and meets the criteria outlined in the qualification criteria specified as per the Tender norms.

4. Period of Validity of Bids

Bids shall remain valid for 120 days after the date of bid opening prescribed by the Purchaser. A bid valid for a shorter period may be rejected by the Purchaser as nonresponsive.

5. Submission of Bids

The detailed technical specification of the equipment is enclosed inBid document, i) Offer should be of two parts Viz., "TECHNICAL BID" and "COMMERCIAL BID" The content of the both bids should be as under:

(a) TECHNICAL BID should include the following:-

- \checkmark Detailed specification of the base equipment (Product Make & Model) along with the specification of accessories, which are included in the Base unit.
- ✓ Scope of supply
- ✓ Deviation Statement
- ✓ Product Literature/Brochure
- ✓ Proforma for Performance Statement
- ✓ Qualification Criteria
- ✓ List of spare parts included (without quoting the price) (the acceptance and rejection of spare parts will be at sole discretion of CIPET:SARP-LARPM)
- ✓ List of optional accessories with their technical specification. (without quoting the price)
- ✓ Manufacturer's Authorization Form
- ✓ Bid Form
- ✓ Any other information which the bidder would like to state about the technically of the equipment.

(b) COMMERCIAL BID should include the following:-

- \checkmark Statement showing the price of the each items of spare parts which is mentioned in the Technical Bid
- ✓ Conditional bids will not be accepted. The condition laid down by CIPET:SARP-LARPM is final and binding on all bidders.

- ✓ The quote should be in Indian Currency (INR).
- ✓ CIPET:SARP-LARPM reserves the right to accept or reject any or all tenders either in part or in full without assigning any reasons thereof.

The bids, which are not containing the statements, mentioned in 5 (i) (a) & (b) are liable to be rejected.

- The proforma of Annexures in the Bidding document, wherever necessary, should be typed on the bidder's letter head and upload the same.
- Price Schedule should be submitted in the prescribed format given under price schedule of the Bidding Document.
- The Deviation Statement enclosed should be duly filled in and submitted along with Bidding Document. If the bidder is offering more than one options/models a separate. Deviation statement for each of such quotes should be submitted along with the offer.
- Quotes received without price schedule and deviation statement as per our prescribed format, will summarily be rejected.
- Relaxation of Norms for Startup and Micro & Small Enterprises in Public Procurement on Prior Experience – Prior Turnover Criteria.

6. Deadline for Submission of Bids

The Purchaser may, at its discretion, extend this deadline for submission of bids by amending the Bid Documents, in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline will thereafter be subject to the dead-line as extended.

7. Evaluation and Comparison of Bids

- The Purchaser will evaluate and compare the bids previously determined to be substantially responsive.
- The availability in India of spare parts and after-sales services for the equipment offered (imported goods) – in the bid; (the inclusion of cost of spare parts for comparison as per requirement will be at sole discretion of CIPET:SARP-LARPM. Also,CIPET:SARP-LARPM reserves right to accept any bid and to reject any bid or all bids.

(F) Award of Contract

- Post Qualification
 - The Purchaser will determine to its satisfaction whether the Bidder selected as having submitted the lowest evaluated responsive bid is qualified to satisfactorily perform the Contract.
 - The determination will take into account the Bidder's financial, technical and production capabilities. It will be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder as well as such other information as the Purchaser deems necessary and appropriate.
 - An Affirmative determination will be a prerequisite for award of the Contract to the Bidder. A negative determination will result in rejection of the Bidder's bid.

• Purchaser's right to vary Quantities at Time of Award

- The Purchaser reserves the right at the time of award of Contract to increase or decrease of the quantity of goods and services specified in the Schedule of Requirements without any change in price or other terms and conditions.
- Purchaser's Right to Accept any Bid and to Reject Any or All Bids

The Purchaser reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligation to inform the affected Bidders or Bidders of the grounds for the purchaser's action.
MANUFACTURER'S AUTHORIZATION FORM

No.....dated..... То School for Advanced Research in Polymers - LARPM, CIPET, B-25, C.N.I Complex, P.O: KIIT, Patia, Bhubaneswar-751024, India. Dear Sir Ref: Bid Reference We who are established and reputabledo authorize hereby M/s..... M/s..... M/s.....etc (Name and address of Agents) to bid and conclude the contract with you against the above Bid are authorized to bid and conclude the contract in regard to this business against this specific Bid.

We hereby extend our full guarantee and warranty as per the Terms andConditions of Contract for the goods offered for supply against this invitation for bid bythe above firms.

Yours Faithfully,

(Name) for and on behalf of M/s..... (Name of Manufactures)

Note: This letter of authority should be on the letterhead of the manufacturing concern and should be signed by a person competent and having the power of attorney to bind the manufacturer

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PERFORMANCE SECURITY FORM

School for Advanced Research in Polymers (SARP)-LARPM, CIPET, B-25, C.N.I Complex, P.O:KIIT, Patia, Bhubaneswar-751024, India.

AND WHEREAS it has stipulated by you with a Bank Guarantee by a recognized bankfor the sum specified therein as security for compliance with the Supplier's performance obligations in accordance with the Contract. AND WHEREAS we have agreed to give the Supplier a Guarantee:

THEREFORE WE hereby affirm that we are Guarantors and responsible to you, on behalf of the Supplier, up to a total of (Amount of the Guarantee in Words and Figures) and we undertake to pay you, upon your first written demand declaring the Supplier to be in default under the Contract and without cavil or argument, any sum or sums within the limit of (Amount of Guarantee) as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This guarantee is valid until theday of.....day of.....

Signature and Seal of Guarantors



Address :....

To:

PROFORMA FOR PERFORMANCE STATEMENT



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Note : Separate Deviation statements should be submitted along with the bid for all models / alternative quotes.

Note :- Further if any e-Tender queries please contact the following officials of <u>etenderwizard</u>:

SI. No.	Name of the Official	Contact Number	e-mail ID
01.	Mr. S.K. Mohapatra	7377708585	twhelpdesk404@gmail.com
02.	Mr. Swades Kumar Bal	7008064095	twhelpdesk404@gmail.com

CIPET:SARP-LARPM reserves the right to accept or reject any or all tenders either in part or in full without assigning any reasons thereof

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Name	1. THERMAL EVAPORATOR SYSTEM
Quantity	01

TECHNICAL SPECIFICATION

Vacuum Chamber	SS 304 Metal Chamber fabricated from polished staipless steel				
	 Approximately 16" x 16" x 18" Height with front door 				
	opening.				
	• 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				
High Vacuum	The chamber is evacuated by a double stage direct				
Pumping System:	drive, rotary vacuum pump, with Edward Turbo pump				
	for high vacuum.				
	• Rotary pump (with appropriate oil/mist filter) for				
	creating initial vacuum till 10 ⁻³ mbar and backing for				
	the turbo pump after that.				
Rotary Vacuum	(1 No) Capacity 250 LPM, Direct drive, Single phase, Double				
Fumping System	bar				
	The pump should be capable for running 24 hrs.				
Turbo Pumping	nEXT400 <mark>D ISO</mark> 100 160W with inlet screen and manual vent				
System	valve Having Field replaceable bearing.01No.				
	01.Effective Pumping speed $->300(LPS)$				
	03. Critical backing pressure -3.5×10^{-1} m. bar.				
4" Butterfly valve	(1No) a hand operated high vacuum valve is fixed to a base				
	plate of 13" diameter. This valve isolates the chamber from				
araha	the pumping system so that the chamber can be brought to				
probe	atmospheric pressure without switching off the pumping				
1" Quarter swing	System. (2 No's) one is for roughing and another for backing				
Butterfly Valves					
A ¹ / ₄ " air admittance	(1 No) is fixed to the chamber pipeline to release the				
valve	chamber vacuum after each coating process cycle.				
Needle valve	[1No] along with the unit for gas purging. A fine control				
	needle valves providing in the pipeline for use during H.T.				
L T/H T Control	Variac (Dimmer) Controller in the input circuit of LT/HT				
	selector provides the output power variation.				
Meters	selector provides the output power variation. Separate digital panel meters provided for HT primary current				
Meters	selector provides the output power variation. Separate digital panel meters provided for HT primary current LT secondary current through current transformers				
Meters Indicator Lamps	selector provides the output power variation. Separate digital panel meters provided for HT primary current LT secondary current through current transformers Glow lamps are to indicate ON/OFF status of rotary pump,				

Power connection	For connection the power to the system 2 meters long		
	15amps wire chord with plug.		
Vacuum Measuring	Digital Pirani Gauge-(1 No): Measure vacuum from .999 to		
Gauges	0.001 m.bar anywhere in the vacuum system with suitable		
	adaptor. I wo gauge heads should be to this gauge to read		
	fore vacuum and roughing vacuum of the system.		
	Digital Penning Gauge- (1No): Measure vacuum from		
	9.9x10 ⁻³ to 1.0x10 ⁻⁶ m.bar anywhere in vacuum system with		
	suitable adaptor.		
L.T Evaporation	Atleast 3 No. of LT electrical feed-through for evaporation,		
Feedthroughs	made of electrolytic pure copper with 200Amps current		
	carrying capacity should be provided.		
Substrate Heater	Maximum Temp: 500°C,		
With Controller	PID ON/Off Controller,		
	K-Type Thermocouple,		
	Heater Size: 3" Diameter,		
	Heating Element: Super kanthal,		
and the second se	Solid State relay and a Transformer.		
Substrate co <mark>oling</mark>	To be provided through water piping (as main quotation).		
facility	Liquid nitrogen cooling facility can be provided as additional		
	cost.		
Digital Thickness	 Appropriate feed through and sensor to be provided 		
monitor	close to the LT source.		
	 Ability to monitor evaporation rates of 0.1 Å/s 		
Quartz Crystal	6 MHz crystal holder with oscillation box and		
Thickness Monitor	co <mark>nnecti</mark> ng cables.		
(DTM):	 Display: 03digit LED. 		
	Thickness Display 4Digit LED auto ranging from 0.000		
	to 999.9 Å.		
	Crystal Frequency: 6MHz		
	 Thickness Set point 0.000 to 999.9KÅ. 		
	Film Dencity:0.800 to 99 99grams/cc		
Control Console	Control console is fabricated with mild steel and neatly		
Control Console	powder coated. It is provided to house all the electrical		
	control instrumentation control switches and standalone		
prope	control nanel of the following switches:		
	\checkmark ON/OFF switches for vacuum numps and all		
	valves		
	✓ vacuum measuring gauges controller		
	✓ Substrate rotation and substrate heater controls		
	The above control console is wired to operate on 230 V AC		
	50Hz. Single phase power supply.		
Support structure	 Should be made out of MS channel and angles neatly 		
	painted		
	 Must have castor wheels for mobility purpose. 		
Source shutter	To cover the evaporation source		
Electrical Controls	Unit operates on 220V A.C 50Hz single phase power supply.		
L.T Power Supply	A 200Amps power supply capable of delivering (1 No)		
	a) 200Amps at 10Volts. And		
	b) 100 Amps at 20 Volts intermittent.		

Safety DevicesAn electrical circuit breaker in different power protects these against over-load shorting. An protection device for vacuum pump motor provided	er supply line An over load r should be			
Ultimate Vacuum ⁶ m.bar in clean cool empty degassed condition of switching on of the pumping system.	The unit is specified to achieve an ultimate vacuum of 1 ×10 ⁻⁶ m.bar in clean cool empty degassed condition within 1 hour of switching on of the pumping system			
Purging Nitrogen and Air purging facility should be available	able			
Warranty 12 months				
Manual Operation Manual to be given after of installation	Operation Manual to be given after delivery and installation			
Inspection CIPET will inspect the instrument for two concerns the second	CIPET will inspect the instrument for two complete runs before despatch from factory outlet.			
AccessoriesBasket: Spiral (10 each)Boat: 10 each (Mo and W)Evaporation materials:Al-wire (99.99%) 50 cm,Ag-wire (99.99%), 50 cmAu-wire (99.99%): 10 cm (OptionCeramic boat (organic evaporation): 5Each 2 set of rubber O-rings for varionPump oil (2.5 lts)Vacuum clamps with metal O-ringsVacuum greaseSpare butterfly valves (1 No.)Pirani gauge (1 No.)Thickness monitor crystals (1-box)All required tools	 Basket: Spiral (10 each) Boat: 10 each (Mo and W) Evaporation materials: Al-wire (99.99%) 50 cm, Ag-wire (99.99%), 50 cm Au-wire (99.99%): 10 cm (Optional) Ceramic boat (organic evaporation): 5 nos Each 2 set of rubber O-rings for various sizes Pump oil (2.5 lts) Vacuum clamps with metal O-rings Vacuum grease Spare butterfly valves (1 No.) Pirani gauge (1 No.) Thickness monitor crystals (1-box) All required tools 			

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PARAMETERS	DETAILS	COMPLIANCE
Vacuum	SS 304 Metal Chamber fabricated from	
Chamber	polished stainless steel.	
	• Approximately 16" x 16" x 18" Height with	
	front door opening.	
	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	
	provision for necessary feed through	
High Vacuum	The chamber is evacuated by a double	
Pumping	stage direct drive rotary vacuum pump with	
System:	Edward Turbo pump for high vacuum.	
,	 Rotary pump (with appropriate oil/mist filter) 	
	for creating initial vacuum till 10 ⁻³ mbar and	
	backing for the turbo pump after that.	
Rotary	(1 No) Capacity 250 LPM, Direct drive, Single	
Vacuum	ph <mark>ase, Double stage</mark> , Oil charge 0.75liters,	
Pumpimg	Ultimate vacuum > [5-6] x10° m. bar.	
System	The pump should be capable for running 24 hrs.	
lurbo	nEX1400D ISO100 1600V with inlet screen and	
System		
System	01 Effective Pumping speed- >300/LPS)	
	02. Ultimate vacuum - 10^{-7} (m. bar)	
	03. Critical backing pressure- 3.5×10^{-1} m. bar.	
4" Butterfly	(1No) a hand operated high vacuum valve is fixed	
valve	to a base plate of 13" diameter. This valve isolates	
	the chamber from the pumping system so that the	0.
	chamber can be brought to atmospheric pressure	
	without switching off the pumping system.	ý.
1" Quarter	(2 No's) one is for roughing and another for	
Swing	backing.	
Valves		
$A^{1/4}$ " air	(1 No) is fixed to the chamber pipeline to release	
admittance	the chamber vacuum after each coating process	
valve	cycle.	
Needle valve	[1No] along with the unit for gas purging. A fine	
	control needle valves providing in the pipeline for	
	use during H.T. discharge cleaning.	
L.T/H.T	Variac (Dimmer) Controller in the input circuit of	
Control	LI/HI selector provides the output power variation.	
IVIETErs	Separate digital panel meters provided for HI	
	current transformers	

-	
Indicator	Glow lamps are to indicate ON/OFF status of rotary
Lamps	pump, Turbo pump, LT, HT and other accessories.
Power	For connection the power to the system 2 meters
connection	long 15amps wire chord with plug.
Vacuum	Digital Pirani Gauge-(1 No): Measure vacuum
Measuring	from .999 to 0.001 m.bar anywhere in the vacuum
Gauges	system with suitable adaptor. Two gauge heads
	should be to this gauge to read fore vacuum and
	roughing vacuum of the system.
	Digital Penning Gauge- (1No): Measure vacuum
	from 9.9x10° to 1.0x10° m.bar anywhere in
	Vacuum system with suitable adaptor.
L.I Even en d'en	Atleast 3 No. of L1 electrical feed-through for
Evaporation	evaporation, made of electrolytic pure copper with
Feedthroughs	200Amps current carrying capacity should be
Cubatrata	provided.
Substrate	Naximum Temp: 500°C,
Controllor	K Type Thermosouple
Controller	Heater Size: 2" Diameter
	Heating Element: Super kanthal
	Solid State relay and a Transformer
Substrate	To be provided through water piping (as main
cooling facility	quotation)
	Liquid nitrogen cooling facility can be provided as
	additional cost.
Digital	Appropriate feed through and sensor to be
Thickness	provided close to the LT source.
monitor	• Ability to monitor evaporation rates of 0.1
	Å/s
Quartz Crystal	6 MHz crystal holder with oscillation box and
Thickness	connecting cables.
Monitor	Display:3digit LED.
(DTM):	Thickness Display 4Digit LED auto ranging
. ,	from 0.000 to 999.9 Å.
P	Crystal Frequency: 6MHz
	 Thickness Set point 0.000 to 999.9KÅ.
	• Film Dencity:0.800 to 99.99grams/cc.
Control	Control console is fabricated with mild steel and
Console	neatly powder coated. It is provided to house all
	the electrical control instrumentation, control
	switches and standalone control panel of the
	following switches;
	✓ ON/OFF switches for vacuum pumps
	and all valves
	✓ vacuum measuring gauges controller
	✓ Substrate rotation and substrate
	heater controls
	The above control console is wired to operate on
	230 V AC, 50Hz, Single phase power supply.

Support	 Should be made out of MS channel and
structure	angles neatly painted
	 Must have castor wheels for mobility
	purpose.
Source shutter	To cover the evaporation source
Electrical	Unit operates on 220V A.C 50Hz single phase
Controls	power supply.
L.T Power	A 200Amps power supply capable of delivering (1
Supply	No)
	a) 200Amps at 10Volts. And
	b) 100 Amps at 20 Volts intermittent.
H.T Power	5000volts DC open circuit.
Supply	3500volts at 50mA high reactance type-1NO
Sofaty Daviaga	An electrical eizewit breaker in different newer
	supply line protects these against over-load
	shorting An over load protection device for
	vacuum pump motor should be provided
Ultimate	The unit is specified to achieve an ultimate vacuum
Vacuum	o <mark>f 1 ×</mark> 10 ⁻⁶ m.bar in clean cool empty degassed
	c <mark>ondition</mark> within 1 hour of switching on of the
	pu <mark>mping system.</mark>
Purging	Nitrogen and Air purging facility should be available
Warranty	12 months
Manual	Operation Manual to be given after delivery
Inspection	CIPET will inspect the instrument for two
inspection	complete runs before despatch from factory
	outlet.
Accessories	Basket: Spiral (10 each)
(Boat: 10 each (Mo and W)
2 C	Evaporation materials:
1	• Al-wire (99.99%) 50 cm,
1	 Ag-wire (99.99%), 50 cm
	 Au-wire (99.99%): 10 cm
	(Optional)
	Ceramic boat (organic evaporation): 5
	nos
	Each 2 set of rubber O-rings for various
	Sizes
	• Pullip OII (2.5 IIS)
	Vacuum clamps with metal O-nings
	 vacuum yrease Spare butterfly valves (1 No.)
	 Opare bulletity valves (1 No.) Dirapi gaugo (1 No.)
	 Finally gauge (1 NO.) Thickness monitor crystals (1-box)
	 All required tools

NAME	:	2. ULTRASONICATOR
QUANTITY	:	01 no.

TECHNICAL SPECIFICATION

Capacity	:	10-600ml		
Ultrasonic power	:	>600W or suitable for required capacity		
Operating Frequency	:	20-25KHz		
Probe	:	Standard non-reactive titanium/titanium alloy		
		probe of size 3/6/8/10/12 mm		
Timer	:	1-90min adjustable digital timer		
Converter		Best quality piezoelectric frequency energy		
		converter		
Display	:	Large screen LCD		
Power supply	Y.	AC 230, 50/60Hz		
Other features		✓ Total time should be adjustable		
		✓ Pulse ON/OFF time should be adjustable to		
		reduce the rise in temperature		
		 Temperature control probe would be preferred 		
		✓ Intensity should be controlled from1-100% for		
		higher degree of resolution		
CIP		✓ Sound abating enclosure should be offered		
Application	: 34	Disperse solids, de-agglomeration of powders,		
probe • p	perfo	degassing of liquids, emulsion preparation,		
		acceleration of chemical reaction, dissolving		
		powders/solids, protein extraction etc.		

PARAMETERS		DETAILS	COMPLIANCE
Capacity	:	10-600ml	
Ultrasonic power	:	>600W or suitable for required	
		capacity	
Operating	:	20-25KHz	
Frequency			4
Probe	:	Standard non-reactive	
		titanium/titanium alloy probe of size	
		3/6/8/10/12 mm	
Timer	:	1-90min adjustable digital timer	
Converter	:	Best quality piezoelectric frequency	
		energy c <mark>onvert</mark> er	
Display	:	Large screen LCD	
Power supply		AC 230, 50/60Hz	
Other features	:	✓ Total time should be adjustable	
		✓ Pulse ON/OFF time should be	
		adjust <mark>able to</mark> reduce the rise in	
		temperature	
	200	✓ Temperature control probe would	
C		be preferred	ट
<u> </u>		\checkmark Intensity should be controlled	
pro	oe	from1-100% for higher degree of	stics
		resolution	
		 ✓ Sound abating enclosure should 	
		be offered	
Application	:	Disperse solids, de-agglomeration of	
		powders, degassing of liquids,	
		emulsion preparation, acceleration	
		of chemical reaction, dissolving	
		powders/solids, protein extraction	
		etc.	

NAME	:	03. DIELECTRIC STRENGTH MEASURING EQUIPMENT		
QUANTITY	:	01		
TYPES OF TESTS TO BE	:	To determine the dielectric breakdown voltage through the		
PERFORMED		thickness of a Polymeric test specimen .It may also be used to determine dielectric breakdown voltage along the interface between a solid specimen in air and oil medium.		
APPLICABLE STANDARD		ASTM D 149		
TECHNICAL SPECIFICATION				

PARAMERTERS	DETAILS						
Voltage Source	Suitable step-up Transformer supplied from a variable sinusoidal low-voltage source with Voltage capacities range 0 to 100 kV rms						
	With ratio of crest to root-mean-square (rms) test voltage ,equal to $\sqrt{2 \pm 5\%}$ (1.34 to 1.48), with the test specimen in the circuit, at all voltages greater than 50% of the breakdown voltage.						
Frequency	from 2 <mark>5 to 80</mark> 0) Hz					
Voltage rise time& accuracy	Suitab <mark>le as pe</mark>	r Method A,B, & C of ASTM D 149					
Voltage rise time Resolution	0.1 kV ±1%						
Test Vessels/Medium	Suitable Oil m	edia Tank in line with the requirement of Standard					
Test Temperature range	10 °C to 65 °C	;					
Temperature resolution	1 °C o <mark>r better</mark>						
Power supply	voltage	85 to 265 VAC					
	frequency	50/60 Hz					
Interface	RS-232 interface, I/O port with safety interlock, USB Host Port for Data/Program storage						
Mandatory Items With the	AC/DC Digital	Voltage Meter: 50,100,150,200kV					
Machine	DC micro-ammeter						
	Electrode set of Type 1 to Type 7 as per standard						
Additional Requirements	Special Features Needed	 Vendors must have sufficient experience in supplying equipment to reputed organizations of Plastic/polymer Industries Magnetic bead stirrers Sample cutter as per standard. 					
	While supplying the Machines, the supplier should also provide the						
	following items apart from above:						
Other Mandatory Items	 Hard copies of Operational & Service Manual- 01Set. Traceable Calibration certificate of equipment. External printer with USB interface and PCL3 driver Machine should come with all other essential accessories & spares required for installation, commissioning& Operation. 						

PARAMETERS	DETAILS	COMPLIANCE
APPLICABLE STANDARD	ASTM D 149	
Voltage Source	Suitable step-up Transformer supplied from a variable	
	sinusoidal low-voltage source with Voltage capacities	
	range 0 to 100 kV rms	
	With ratio of crest to root-mean-square (rms) test	
	voltage ,equal to $\sqrt{2} \pm 5$ % (1.34 to 1.48), with the test	
	specimen in the circuit, at all voltages greater than 50 %	
	of the breakdown voltage.	
Frequency	from 25 to 800 Hz	
Voltage rise time& accuracy	Suitable as per Method A,B, & C of ASTM D 149	
Voltage rise time Resolution	0.1 kV ±1%	
Test Vessels/Medium	Suitable Oil media Tank in line with the requirement of	
Test Temperature range	10 °C to 65 °C	
Temperature resolution	1 °C or better	
	voltage 85 to 265 VAC	
Power supply	frequency 50/60 Hz	
Interface	RS-232 interface I/O port with safety interlock. USB	
	Host Port for Data/Program storage	
Mandatory Items With the	AC/DC Digital Voltage Meter: 50,100,150,200kV	
Machine	DC micro-ammeter	
	Electrode set of Type 1 to Type 7 as per standard	
Additional	Vendors must have sufficient	
Requirements	experience in supplying equipment to	
	Special reputed organizations of	
	Plastic/polymer Industries	
	Magnetic bead stirrers	
	 Sample cutter as per standard. 	
Other Mandatory Items	While supplying the Machines, the supplier should also	
C	provide the following items apart from above:	
C	Hard copies of Operational & Service Manual-	
	01Set.	
pro	 Traceable Calibration certificate of equipment. 	
	• External printer with USB interface and PCL3	
	driver	
	Machine should come with all other essential	
	accessories & spares required for installation,	
	commissioning& Operation	

NAME	:	04. VOLUME & SURFACE RESISTIVITY TESTER WITH ALL RELATED ACCESSORIES		
QUANTITY	:	01 Set		
TYPES OF TESTS TO BE PERFORMED	•	Volume Resistivity & Surface resistivity of various Polymeric materials according to various Indian and International standards.		
APPLICABLE STANDARD		ASTM D 257		

TECHNICAL SPECIFICATION

PARAMERTERS	DETAILS					
Resistance Measurement Range	10^{3} to 1 x $10^{14} \Omega$ Type of Measurement: Direct-reading from the instrument Ohms Shunted by Insulation Resistance from main electrode to Guarded Electrode					
Resistance Measurement accuracy	±0.5% of setting value					
Test Voltage Range	Programmable test voltage up to 1000V					
Voltage Accuracy	±(1% of setting +2V) with resolution 250 mV					
Display type	High-visibility blue LCD Graphical Display, High-Voltage Indicator & Pass/Fail indicator.					
Standard features	Fully programmable via on-screen, Safety interlock, keypad lockout, measurement averaging (1-140 readings), programmable test times, automatic zeroing of test leads					
Operating temp. range	0° C to 50 °C					
Operating humidity range	<45% RH					
Electrode	 Standard electrodes with guard ring. The electrodes for insulating materials should be of a material that is readily applied, allows intimate contact with the specimen surface, and introduces no appreciable error because of electrode resistance or contamination of the specimen. The electrode material should be corrosion-resistant under the conditions of test. For tests of fabricated specimens such as feed-through bushings, cables, etc. 2) Bread combination of electrodes support for measuring a wide 					
	2) Broad combination of electrodes support for measuring a wide variety of objects having different size and shape(Circular, Rectangular, Square, Tube, Cable etc.)					
Calibration Kit	Required calibration kit should be provide along with instrument.					

Interface	RS-232 interface , I/O port with safety interlock, USB Host Port for Data/Program storage					
Additional Requirements	Special Features Needed	 Vendors must have sufficient experience in supplying equipment to reputed organizations of Plastic/polymer Industries Sheets and molded products should be measured just as they are without the need to cut samples. 				
Testing	Should be Suitable For Electrical testing of Plastics, Rubbers, Films, FRP Composites.					
Power Supply (Mains)	220 V AC in single					
Other Mandatory Items	While supply following item : Hard Trace Machi spare	ing the Machines, the supplier should also provide the s apart from above: copies of Operational & Service Manual- 01 Set . able Calibration certificate of equipment . ne should come with all other essential accessories & s required for installation, commissioning& Operation.				

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PARAMETERS	DETAILS	COMPLIANCE
APPLICABLE STANDARD	ASTM D 257	
Resistance Measurement Range	10^3 to 1 x $10^{14} \Omega$ Type of Measurement: Direct-reading from the instrument Ohms Shunted by Insulation Resistance from main electrode to Guarded Electrode	
Resistance Measurement accuracy	±0.5% of setting value	
Test Voltage Range	Programmable test voltage up to 1000V	
Voltage Accuracy	±(1% of setting +2V) with resolution 250 mV	
Display type	High-visibility blue LCD Graphical Display, High-Voltage Indicator & Pass/Fail indicator.	
Standard features	Fully programmable via on-screen, Safety interlock, keypad lockout, measurement averaging (1-140 readings), programmable test times, automatic zeroing of test leads	
Operating temp. range	0° C to 50 °C	
Operating humidity range	<45% RH	
Electrode	 Standard electrodes with guard ring .The electrodes for insulating materials should be of a material that is readily applied, allows intimate contact with the specimen surface, and introduces no appreciable error because of electrode resistance or contamination of the specimen. The electrode material should be corrosion-resistant under the conditions of test. For tests of fabricated specimens such as feed-through bushings, cables, etc. Broad combination of electrodes support for measuring a wide variety of objects having different 	
	size an <mark>d sh</mark> ape(Circular, Rectangular, Square, Tube, Cable etc.)	
Calibration Kit	Required calibration kit should be provided along with instrument.	
Interface	RS-232 interface, I/O port with safety interlock, USB Host Port for Data/Program storage	
Additional Requirements	 Vendors must have sufficient experience in supplying equipment to reputed organizations of Plastic/polymer Industries Sheets and molded products should be measured just as they are without the need to cut samples. 	
Testing	Should be Suitable For Electrical testing of Plastics, Rubbers, Films, FRP Composites.	
Other Mandatory Items	While supplying the Machines, the supplier should also	
	provide the following items apart from above:	
	 Hard copies of Operational & Service Manual- 01 Set. Traceable Calibration certificate of equipment. Machine should come with all other essential accessories & spares required for installation, commissioning& Operation 	

NAME	:	05. Viscometer
Quantity	:	01
Purpose	•••	To estimate the viscosity of the polyols, oil and other raw materials.
Principle/ Definition	:	Based on the concept of measuring the viscosity from the relative motion of the fluid and surface when the flow condition has a small Reynolds number for there to be laminar flow.
Reference Standard	:	ASTM D4889 – 15, ASTM D4878 - 15, ASTM D445 – 18, ISO 2884.

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TECHNICAL SPECIFICATION

PARAMETERS	:	DETAILS
Range of viscosity	:	1-6 M
Sample Type	:	Liquids
Temperature	:	Built in RTD Temperature probe
RPM	:	0.1-200
No. of Increments	:	Predefined speed as well as option for customizable speed shall be available
Instrument leveling	:	Manual
Spindle Selection		Manual
Sample Volume probe · perf	Sr	Max. 750 mittice · Plastics
Accuracy	:	± 1% of the range
Repeatability	:	± 0.2% of the range
Data Storage Option	:	Real Time Data Storage with Date and Time and capability of internal data storage of min of 100 MB
Math Models	:	All suitable models for high and low viscous material
Dialogue Language	:	English
Spindle Coupling	:	Screw/magnetic or with advanced technology.
Spindles	:	04no. or more

Spindle Material	:	Chemical resistant material			
Display of Reading	:	Direct display of reading in multiple units for viscosity, temperature, shear rate/stress, % Torque, Speed/Spindle and Step Program.			
Communication	:	 USB, RS232 and parallel port communication with an option to connect with a printer. The instrument should be stand alone and also have the possibility for computer control. 			
Microcontroller Specifications	:	 Color screen display Real time trend indicator Option for concurrent graphing in the measurement. Looping functions for repetitive tests 			
Other Mandatory Items	:	 Looping functions for repetitive tests While supplying the Machines, the supplier should als provide the following items apart from above: Hard copies of Operational & Service Manual- 0 Set. Machine should come with all other essenti accessories & spares required for installatio commissioning& Operation Onsite Training to be provided for all officers commissioning site. Pre Installation requirements should be provided by Bidder 			

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PARAMETERS	:	DETAILS	COMPLIANCE Y/N
Range of viscosity	:	1-6 M	
Sample Type	:	Liquids	
Temperature	:	Built in RTD Temperature probe	
RPM	:	0.1-200	
No. of Increments	:	Predefined speed as well as option for customizable speed shall be available	
Instrument leveling	:	Manual	
Spindle Selection	:	Manual	
Sample Volume	:	Max. 750 ml	
Accuracy	:	± 1% of the range	
Repeatability	:	± 0.2% of the range	
Data Storage Option	:	Real Time Data Storage with Date and Time and capability of internal data storage of min of 100 MB	
Math Models	:	All suitable models for high and low viscous material	
Dialogue Language	:	English	
Spindle Coupling	i	Screw/magnetic or with advanced technology.	
Spindles	DE	04no. or more practice Plastics	
Spindle Material	:	Chemical resistant material	
Display of Reading	:	Direct display of reading in multiple units for viscosity, temperature, shear rate/stress, % Torque, Speed/Spindle and Step Program.	
Communication	:	 USB, RS232 and parallel port communication with an option to connect with a printer. The instrument should be stand alone and also have the possibility for computer control. 	
Microcontroller Specifications		 Color screen display Real time trend indicator Option for concurrent graphing in the measurement. 	

		Looping functions for repetitive tests	
Other Mandatory Items	:	 While supplying the Machines, the supplier should also provide the following items apart from above: Hard copies of Operational & Service Manual- 01 Set. Machine should come with all other essential accessories & spares required for installation, commissioning& Operation Onsite Training to be provided for all officers at commissioning site. Pre Installation requirements should be provided by Bidder. 	



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NAME	:	06.Dry Blender/ High Speed Mixture
QUANTITY	:	01 Set

TECHNICAL SPECIFICATION FOR HIGH SPEED MIXER

PARAMERTERS	:	DETAILS		
Туре	:	Single Stainless Steel sturdy caster wheel for easy movement		
Capacity	:	2-3 Kg (Bulk density of material 0.4 to 0.7 gm/cc)		
Gross volume of mixing vessel	:	10 litres or above		
Motor	:	3.7 Kw or better AC Motor, 3 phase		
Motor make	:	Siemens or ABB		
Motor Speed	:	As per requirement to be specified by the bidder		
Power supply	:	To be Specified by bidder		
Material of construction	:	 Inner and outer of mixing vessel to be of SS-304. Interior of mixing vessel to be mirror polished surface. Mixing tool to be of SS-304. Mixing vessel to have a deflector of SS-304 for better dispersion. Mixing blades should have configuration for easy removal (disassemble) & maintenance 		
Noise level	:	less th <mark>an 90 d</mark> b		
Mixing time	:	0-10 min		
Other Requirements	F	 Machine should have a seal below blade assembly to prevent jamming of bearings by powder infiltration. Machine to be equipped with a discharge section to take material out after completion of mixing. Machine to have temperature sensor for monitoring and displaying mixing temperature. 		
Other Mandatory Items	:	 While supplying the Machines, the supplier should also provide the following items: Hard copies of Operational & Service Manual- 01 Set. Calibration Certificate of rpm measuring device& temperature Sensors Machine should come with all other essential accessories & spares required for installation, commissioning& Operation. 		

PARAMETERS	DETAILS	COMPLIANCE
Туре	Single Stainless Steel sturdy caster wheel for easy movement	
Capacity	2-3 Kg (Bulk density of material 0.4 to 0.7 gm/cc)	
Gross volume of mixing vessel	10 litres or above	
Motor	3.7 Kw or better AC Motor, 3 phase	
Motor make	Siemens or ABB	
Motor Speed	As per requirement to be specified by the bidder	
Power supply	To be Specified by bidder	
Material of construction	 Inner and outer of mixing vessel to be of SS- 304. Interior of mixing vessel to be mirror polished surface. Mixing tool to be of SS-304. Mixing vessel to have a deflector of SS-304 for better dispersion. Mixing blades should have configuration for easy removal (disassemble) & maintenance 	
Noise level	less than 90 db	
Mixing time	0-10 min	
Other Requirements	 Machine should have a seal below blade assembly to prevent jamming of bearings by powder infiltration. Machine to be equipped with a discharge section to take material out after completion of mixing. Machine to have temperature sensor for monitoring and displaying mixing temperature. 	
Other Mandatory Items	 While supplying the Machines, the supplier should also provide the following items: Hard copies of Operational & Service Manual- 01 Set. Calibration Certificate of rpm measuring device& temperature Sensors Machine should come with all other essential accessories & spares required for installation, commissioning& Operation. 	