



An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

ENQUIRY

NOTICE INVITING TENDER

Phone: +91 431 257 7653

Fax :

Email : skaruna@bheltry.co.in

spsy@bheltry.co.in

kmk@bheltry.co.in

Web : www.bhel.com

TWO PART BID

Enquiry
Number:

Enquiry
Date:

Due date for submission
of quotation:

Tender to be submitted in two Parts

2601700044

14.07.2017

09.08.2017

You are requested to quote the Enquiry number date and due date in all your correspondence. This is only a request for quotation and not an order.

Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 hrs on the Date of tender opening.

Item	Description	Quantity	(Indigenous Vendors) Matl. will be Delivered to
10	Ion Beam Milling Equipment for Specimen Preparation of Transmission Electron Microscope as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	1.00 No.	FOR, BHEL Stores, High Pressure Boiler Plant, Tiruchirappalli - 620014
20	Disk Punch for Specimen Preparation of Transmission Electron Microscope as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	1.00 No.	FOR, BHEL Stores, High Pressure Boiler Plant, Tiruchirappalli - 620014
30	Specimen Lapping and Disk Grinding Kit for Specimen Preparation of Transmission Electron Microscope as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	1.00 No.	FOR, BHEL Stores, High Pressure Boiler Plant, Tiruchirappalli - 620014
40	Dimpler Unit and Consumables for specimen Preparation of Transmission Electron Microscope as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	1.00 No.	FOR, BHEL Stores, High Pressure Boiler Plant, Tiruchirappalli - 620014
50	Low Speed Diamond Saw for specimen Preparation of Transmission Electron Microscope as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	1.00 No.	FOR, BHEL Stores, High Pressure Boiler Plant, Tiruchirappalli - 620014



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Item	Description	Quantity	(Indigenous Vendors) Matl. will be Delivered to
60	Ultrasonic Cutter with Cress Section kit for specimen Preparation of Transmission Electron Microscope as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	1.00 No.	FOR, BHEL Stores, High Pressure Boiler Plant, Tiruchirappalli - 620014
70	Twin Jet Electro Polisher for specimen Preparation of Transmission Electron Microscope as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	1.00 No.	FOR, BHEL Stores, High Pressure Boiler Plant, Tiruchirappalli - 620014
80	Precision Vertical Diamond Wire Saw for specimen Preparation of Transmission Electron Microscope as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	1.00 No.	FOR, BHEL Stores, High Pressure Boiler Plant, Tiruchirappalli - 620014
90	Plasma Cleaner for specimen Preparation of Transmission Electron Microscope as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	1.00 No.	FOR, BHEL Stores, High Pressure Boiler Plant, Tiruchirappalli - 620014

Important points to be taken care during submission of offer

1. Material shall be delivered to: Indigenous Vendors: As stated above.
Foreign Vendors: CFR Chennai Seaport / Airport
2. Delivery required 6 Months including PDI from the date of purchase order.
3. Erection & Commissioning period required 3 Weeks from the date of intimation by BHEL to vendor for deputation of their Engineers for E & C.
4. EMD for this Tender will be (INR) : 2,00,000.00
5. Compliance Form Nos.: TRY/IMP/02 & TRY/IND/02A to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.
6. All updates, amendments, corrigenda, etc., (if any), for each tender will be posted only on the above websites from time to time, as and when required, until each tender is opened. There will be no publication of such updates, amendments, corrigenda, etc., through newspapers or any other media.

BHEL's General guidelines / instructions (refer MM / CE / GENL / 001 - EMD) including bank guarantee formats and list of consortium banks, commercial terms check-list can be downloaded from BHEL web site <http://www.bhel.com> or from the Government tender website <http://tenders.gov.in> (public sector units > Bharat Heavy Electricals Limited page) under above Enquiry reference.

Tenders should reach us before 14:00 hours on the due date
Tenders will be opened at 14:30 hours on the due date
Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present

Yours faithfully,
For BHARAT HEAVY ELECTRICALS
LIMITED

DGM / Capital Equipment / MM

S.PARTHASARATHY
MANAGER
CAPITAL EQUIPMENT / MM
BHEL, TRICHY-620014.

PART- A**TENDER REQUIREMENTS FOR THE SUPPLY OF 'SPECIMEN PREPARATION EQUIPMENT FOR TRANSMISSION ELECTRON MICROSCOPE [T E M]'****SECTION – I: Qualifying Criteria**

The BIDDER is expected to give complete details against each clause in the table given below and wherever necessary an additional sheet may be attached (giving clear reference number) to cover the required details. Otherwise the technical offer will not be considered.

S.No.	TENDER PARTICULARS	BIDDER's RESPONSE
1.1	BIDDER/Original Equipment Manufacturer (OEM) should have supplied & commissioned at least TWO numbers in each type of the offered model of 'SPECIMEN PREPARATION EQUIPMENT' used for the application in TRANSMISSION ELECTRON MICROSCOPE, in the past TEN years.	(as on the date of opening of this Tender).
1.2	BIDDER/OEM should quote, who have supplied and commissioned in the last TEN years (as on the date of this tender opening) at least ONE number in each type of the quoted model of 'SPECIMEN PREPARATION EQUIPMENT' for use in TRANSMISSION ELECTRON MICROSCOPE (TEM) System : (i) in at least one country other than the country of origin to establish OEM's Global business activity or (ii) atleast one number in India. The referred equipment / systems shall be presently working satisfactorily for more than one year from the date of commissioning (as on the date of this tender opening). The name and contact addresses of the customers to whom the above said equipment were supplied to be furnished with details.	
1.3	BIDDER has to submit at least ONE PERFORMANCE CERTIFICATE for satisfactory performance of "SPECIMEN PREPARATION EQUIPMENT supplied for use in TRANSMISSION ELECTRON MICROSCOPE System" as referred under Clause 1.2 above, for a minimum period of one year from the Date of Commissioning from BIDDER's Customer(s) in India or in any other Country outside the Country of Origin, supplied and commissioned in the last TEN years.	(as on the original date of this tender opening)
1.4	Performance Certificate in Original Form may also be sent directly to BHEL / Purchase Department through E-mail / TELEFAX directly by the Customer of the BIDDER. For obtaining the Performance Certificate, a suggestive format is provided in the enclosure ANNEXURE - A.	

S.No.	TENDER PARTICULARS	BIDDER's RESPONSE
1.5	BHEL reserves the right to verify the information provided by the BIDDER for the referred equipment at their referred customer's works. It shall be the responsibility of the BIDDER to facilitate the visit of BHEL's team to their referred Customer's Works. The Travel, Boarding, and Lodging expenses for BHEL Personnel shall be borne by BHEL. In case the information provided by BIDDER is found to be false / incorrect, the offer shall be rejected. BHEL reserves the right to accept or reject the OEM's Offer, based on the assessment of their technical and financial capability.	

SECTION – II

The BIDDER and OEM are requested to provide the following information:-

S.No.	TENDER PARTICULARS	BIDDER's RESPONSE
2.1	Specify details of each 'SPECIMEN PREPARATION EQUIPMENTS FOR TRANSMISSION ELECTRON MICROSCOPE' system supplied to any other unit of BHEL, if any and to provide details on model and year of commissioning	
2.2	Details on SERVICE-AFTER-SALES Set-up in India including the Address of Agent/Service Centers In India.	
2.3	Any Additional data to supplement the manufacturing capability of the OEM for the subject equipment.	

SECTION – III

The BIDDER to note the following and comply with while submitting the OFFER:

S.No.	TENDER PARTICULARS	BIDDER's RESPONSE
3.1	The BIDDER shall submit the offer in TWO PARTS-Technical [with PART A & PART B] and Commercial and Price Bid in separate covers.	
3.2	The Offer shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the BIDDER, against each clause. A just 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer. In case of any deviations in any of the technical specifications, such deviations should be clearly specified in the comparative statement. All systems and sub systems proposed in the solution should be detailed in description with illustrations / photographs, if required	

S.No.	TENDER PARTICULARS	BIDDER's RESPONSE
3.3	The BIDDER shall assure a continuous support for SPARES and SERVICE for five years, from the date of commissioning of the equipment at BHEL Works (an undertaking need be submitted).	
3.4	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details / literature on the QUOTED MODELS of each type of 'SPECIMEN PREPARATION EQUIPMENT' used for the applications in advanced class TRANSMISSION ELECTRON MICROSCOPE Units / Systems.	
3.5	The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation for the scope of supply.	
3.6	Earlier performance & field experience (service support) with BHEL (if any) will be a reckoning factor for the technical qualification of the OFFER. BIDDER can quote the details on the similar supply to BHEL Units.	

ANNEXURE - A

Suggestive Format for the Performance Certificate

The Performance should be certified by the BIIDER's/OEM's Customer(s) on Customer's Letter Head and submitted along with the OFFER or sent directly to BHEL with the Tender Enquiry Number as the reference.

PERFORMANCE CERTIFICATE

1.0	Name / Type of the Equipment	
2.0	Supplier's Name & Address	
3.0	Make and Model number of each type of 'SPECIMEN PREPARATION EQUIPMENT FOR TRANSMISSION ELECTRON MICROSCOPE' System and other Major Accessories forming part of the main equipment	
4.0	Month & Year of Commissioning	
5.0	Application for which the Equipment is generally used	
6.0	EQUIPMENT DETAILS :	
6.1	Size of the specimen / samples / jobs handled in the subject equipment, given under the above Clause No. 3.0	
7.0	Performance of the Equipment (Please tick the appropriate option)	☐ Satisfactory ☐ Not-Satisfactory
8.0	Service after Sales Support given by the Vendor / OEM (Please tick the appropriate option)	☐ Satisfactory ☐ Not - Satisfactory
9.0	Other Remarks (if any)	
Date :		 Signature & Seal of the Authority Issuing the Performance Certificate

PART B**TECHNICAL SPECIFICATIONS FOR 'TEM SPECIMEN PREPARATION EQUIPMENT'**

S. No.	PARTICULARS AND BHEL SPECIFICATION	BIDDER's OFFER [Supported with Technical Details]
AA.	ION BEAM MILLING EQUIPMENT [Item No.1]	
1.0	PURPOSE & APPLICATION	
	Primarily for TEM sample preparation (3 mm dia. samples) a) from the following materials: Plain Carbon Steels, Low Alloy and High Alloy Steels (1.25 Cr Steels, 9 Cr Steels), Stainless Steels (18 Cr Steels, Super304 H, etc.), Ni-based Super Alloys (such as Inconel 617, Inconel 740, Inconel 738, Hastelloy X, Inconel 625, etc.), Cast Irons, Ceramics, Brass samples, Copper samples, Aluminium samples, Cobalt based Super Alloys b) the equipment shall be preferably upgradable to SEM sample preparation also. This SEM sample preparation upgradable capability shall be quoted as OPTIONAL.	
2.0	SYSTEM TYPE	
2.1	Table/Bench type : top unit Ion-milling system offered must be a table-top or bench-top model. A compatible table for bearing its weight, operation of the equipment with storage drawers (for spares and accessories) with lock has to be quoted additionally as an optional item.	
2.2	Input Power Supply (by BHEL) : $230 \pm 10\%$ Volts, 50 ± 3 Hz, Single Phase AC through a 3 wire system. Necessary adapters (if any) have to be provided along with the equipment. NOTE : If required a $415 \pm 10\%$ Volts, 50 ± 3 Hz, 3 Phase supply through a 4 wire system is possible by BHEL.	
2.3	Ion-milling system offered should be capable of milling in such a way that large electron transparent areas are available both for conventional TEM mode as well as High Resolution (HR) TEM modes of operation.	

S. No.	PARTICULARS AND BHEL SPECIFICATION	BIDDER's OFFER [Supported with Technical Details]
3.0	ION SOURCE	
3.1	2 ion-sources / guns (Saddlefield type/ Penning-type) : Motorized guns are preferred. Both having same energy ranges for operation in order to produce distortion free sample during milling.	
3.2	Beam diameter (FWHM) for the guns: 500 microns or higher at the sample. A mechanism for observing beam alignment has to be provided	
3.3	Ion-current density : peak value shall be 1mA/cm ² . Milling angle : - 10 deg. to +10 deg. and should be adjustable during operation. These have to be continuously and independently variable	
3.4	Both the ion-sources must have independently adjustable milling angle, independently adjustable gas flow control using mass-flow controller / regulators / motorized needle valve for either rapid or slow ion-milling	
3.5	Installing / Mounting and removing these guns from the equipment should be easy during replacement / change of any consumables inside the gun (if any)	
3.6	Gas to be used for ion-sources must be Argon, 99.99% or higher purity and a cylinder with full gas capacity of this has to be provided along with the equipment during installation and commissioning. NOTE : The Argon Gas Cylinder and all connecting piping and regulators / flow controllers required for connecting this cylinder to the equipment have to be included in the offer. [These items can be sourced from India itself, through OEM's Local Representative].	
3.7	Ion-source operating energy ranges : 800 eV to 8 keV. [<800 eV for lower part of range and >8 keV for higher part of range are preferable and offered as optional. But 800 eV to 8 keV range is COMPULSORY]	
3.8	Consumables : The Offer/Bid should include consumables required for upto 1000 hours of initial operation of these guns along with the equipment . The consumables have to be listed item wise and quoted with unit rate separately. The recommended quantity shall be indicated and justified clearly in the compliance sheet.	

S. No.	PARTICULARS AND BHEL SPECIFICATION	BIDDER's OFFER [Supported with Technical Details]
4.0	SPECIMEN STAGE AND MILLING CHAMBER REQUIREMENTS	
4.1	Loading and unloading of the samples has to be done using an air-lock system which prevents the entire milling chamber to be vented. This air-lock system should be provided with a specimen exchange mechanism for rapid transfer of specimens in less than 3 minutes.	
4.2	Specimen stage should be capable of in-plane specimen rotation (oscillation is preferable from 0 to 120 degrees) which has to be computer controllable / programmable. Rotation speed should be atleast 5 rpm.	
4.3	It should be possible to have milling only from one side (Sector milling capability) for preparation of cross-sectional TEM samples	
4.4	Capability for having atleast 0.5 mm movement of sample holder [in either direction (+/-)] within the Milling Chamber is ESSENTIAL	
4.5	The offered equipment should have the capability for preparation of cross-sectional samples. If any additional attachments are required for preparation of such cross-sectional specimens in ion-milling system, those accessories have to be listed, quoted and justified for use. Diameter of samples to be held : 3 mm	
5.0	SAMPLE/ SPECIMEN HOLDER(S)	
5.1	Specimen Holding Mechanism : Two numbers are to be supplied with Clamping Type mechanism for double side milling and two numbers with Gluing Type mechanism also to be quoted.	
5.2	Each sample holder has to have a life for atleast 500 hours of operation and the necessary spares/consumables such as clamp rings, etc., shall be offered along with the specimen holders.	
5.3	For gluing type specimen holders, all the accessories such as hotplate, mounting resin, etc. which are required for gluing and also for removing the sample from the specimen holder have to be offered with name of items / chemicals / trade names including recommended quantity and unit rate.	
5.4	Accessories such as tweezers / any specimen mounting kits, etc. which are required for handling the sample have to be compulsorily quoted with technical details.	
5.5	Sample / Specimen holder materials should be of the following : Graphite / Molybdenum / Copper / Stainless Steel / Aluminium.	

S. No.	PARTICULARS AND BHEL SPECIFICATION	BIDDER's OFFER [Supported with Technical Details]
5.6	An user friendly mechanism shall be provided for loading and unloading the samples in the specimen holder. BIDDER has to provide the technical details	
5.7	The specimen holders should have long life and durability. These holders are for ambient temperature milling only. BIDDER to indicate the life of the Holders offered suiting to the above technical clauses. [Liquid Nitrogen compatible holders are described in a separate section of this enquiry]	
6.0	IMAGING OR VIEWING SYSTEM/ ACCESSORIES	
6.1	The offered equipment should have the facility for in-situ viewing of the sample preparation process by means of either a Binocular Microscope or a Stereo Microscope with atleast '50X' magnification. The sample viewing facility with a Digital / CCD / CMOS Camera enabling the zooming options to atleast 100X attached to the image recorder, shall be offered as an OPTIONAL Item.	
6.2	The equipment should have the facility for the recording of images of the sample being milled. A Video Image Recorder is preferred and quoted as an Optional Item.	
6.3	The equipment should have the controls from GUI for setting the intensity of light for viewing purposes.	
6.4	Automatic shutter facility should be provided to reduce window contamination when not viewing the specimen	
7.0	VACUUM SYSTEM	
7.1	Pumping System: Dry pumping system with Diaphragm Pump (oil-free, two stage or four stage) and a Turbo Molecular/ Drag Pump should be offered with complete technical details.	
7.2	Vacuum Gauge: Cold Cathode type for measuring high vacuum in the chamber and Solid-state Vacuum Gauge/ Pirani Vacuum Gauge for measuring low vacuum should be offered with complete technical details.	
7.3	Pressure of the main chamber (base pressure) : <1x10⁻⁵ mbar. There should be a facility in GUI to monitor pressure constantly	

S. No.	PARTICULARS AND BHEL SPECIFICATION	BIDDER's OFFER [Supported with Technical Details]
8.0	USER INTERFACE, CONTROLS & TERMINATION OF MILLING PROCESS	
8.1	State of the art touch screen and/or computer controller with data-logging, storing and printing capabilities have to be provided by the OEM of the equipment (along with the equipment) for monitoring the process parameters, controlling the milling process, etc. This facility has to be connected to the equipment (by LAN, etc.) for recording/storing images and videos.	
8.2	Auto termination should be possible by (a) optics/laser for opaque samples/ image processing techniques (b) time elapse method/ timer control.	
8.3	Features such as pre-programmed recipes and user defined setting of parameters should be available. Also capability to store new programs should be available.	
8.4	Automated sample loading from the airlock chamber should be possible.	
8.5	Capability for monitoring evolution of surface topography by image analysis should be available.	
8.6	All variables such as chamber pressure, milling parameters, etc. have to be visible in the GUI during operation	
8.7	The operator should be able to start, stop or pause the milling process from the controller unit.	
8.8	This touch screen and/or computer controller should be capable of remote diagnosis or service by the OEM, when connected to internet . Help files (if any) should be provided for general maintenance (such as installation of gun/ during replacement of spares, etc.	
9.0	SPECIMEN COOLING SYSTEM AND ACCESSORIES	
9.1	The Equipment should be provided with a Liquid Nitrogen based and close circuit cooling system. The cooling system should not cause phase transformation of the material being milled. The medium should be disposed on the sample or its surrounding during milling for maintaining low temperature at the sample.	

S. No.	PARTICULARS AND BHEL SPECIFICATION	BIDDER's OFFER [Supported with Technical Details]
9.2	Two numbers of clamp type specimen holders, compatible for this kind of operation at low temperatures [apart from the ambient temperature holders], should be offered and technical features elaborated in the OFFER.	
9.3	Accessories such as tweezers/ any specimen mounting kits, etc. which are required for handling the sample at very low temperatures, should be quoted with technical details.	
9.4	An user friendly mechanism for loading and unloading the samples at very low temperatures in the specimen holder, has to be offered with details.	
9.5	The specimen holder should have long life and durability. Cold stage shall have 6-8 hour dewar capacity; The specimen temperature should be measured in-situ and a provision for this has to be made available.	
9.6	Automated cooling and warm-up/heat-up of the sample should be done (using in-built heater preferably) and a mechanism should exist for this operation.	
9.7	Storage of liquid Nitrogen should be possible either internally or externally and a mechanism to automatic dispensing shall also be provided. Volume of storage and the technical details pertaining to the above, have to be described.	
9.8	A Liquid Nitrogen storage flask has to be supplied along with the equipment for transporting and storage of the required amount of LN2 from LN2 suppliers' location to the location of the main equipment.	
10.0	CLEANING ACCESSORIES	
10.1	Two sets of cleaning accessories for cleaning the milling chamber and the total equipment have to be provided along with the equipment. [If a function is already existing in the offered equipment for self-cleaning, it has to be detailed out. If such accessories are not necessary, clear reasons as to why cleaning accessories are not required have to be mentioned in detail.]	
11.0	ERECTION/INSTALLATION & COMMISSIONING AND TRAINING	
11.1	Erection and Commissioning or Installation has to be done at Welding Research Institute, BHEL Tiruchirappalli/INDIA, by the OEM or their authorized service agency/ personnel. All the cables and adapters required for integration of the equipment have to be supplied along with the equipment.	

S. No.	PARTICULARS AND BHEL SPECIFICATION	BIDDER's OFFER [Supported with Technical Details]
11.2	It is the responsibility of the SUPPLIER / OEM to integrate all the systems and ensure the functionality in total. Supplier should intimate their requirements (if anything additionally required) for the installation and commissioning after the receipt of the BHEL Purchase Order . If so, this has to be quoted separately as an optional item.	
11.3	Demonstration of ion milling for some of the samples available with BHEL has to be done at the time of Equipment Installation & Commissioning. (Depending on the samples available at BHEL at that point of time, or SUPPLIER can bring the standard samples for performance prove-out at BHEL)	
11.4	Training in Operation and Basic Maintenance has to be provided to TWO BHEL Staff on-site for usage of all modes of the equipment.	
12.0	DOCUMENTATION	
12.1	Three copies of the Operation & Maintenance in English (Hardcopy) should be supplied along with the equipment indicating: detailed usage / operating instructions for various types of samples, cleaning procedures and trouble-shooting guide (including the safety aspects involved for the operator and MSDS for the materials / consumables used in the equipment)	
12.2	Maintenance and Service Manuals Apart from the above, CD(s)/ DVD(s) containing soft copy of the above indicated instruction manuals MUST also be provided.	
13.0	GUARANTEE	
13.1	Vendors shall provide a guarantee for 12 months from the date of commissioning of the equipment or 18 months from the date of supply, whichever is earlier.	
13.2	Extended warranty for 24 months is also to be quoted separately as an optional item. Contact information of service engineers MUST be provided at the time of Installation or E&C, with an undertaking for the guarantee.	
13.3	Availability of trained service engineers in India for attending any problem associated with the equipment should be ensured within a notice period of FOUR Working Days.	

S. No.	PARTICULARS AND BHEL SPECIFICATION	BIDDER's OFFER [Supported with Technical Details]
14.0	SPARES & CONSUMABLES	
14.1	Recommended or suggested spares, consumables and tools kit (including major tools required for servicing at site) for atleast TWO years of continuous operation of the equipment, shall be indicated by the Original Equipment Manufacturer ; and to be listed and quoted with unit rate. The OFFER shall also contain the list of spares those are normally required for a prolonged usage of TEN years, has to be provided by the OEM based on his field experience.	
15.0	SPECIAL ACCESSORIES	
15.1	Sample / Specimen Holders for EBSD, TEM (dia. 2.3mm) and Slope Cutting Facility need also be offered, as optional items.	

BB.	DISK PUNCH [Item No.2]	
S. No.	PARTICULARS AND BHEL SPECIFICATION	BIDDER's OFFER [Supported with Technical Details]
1.0	PURPOSE & APPLICATION	
1.1	The samples and the specimen used in Transmission Electron Microscopy (TEM) need to be punched to 3 mm in diameter .	
2.0	REMOVAL OF SAMPLES	
2.1	After punching, it should be easy to remove the cut disks from the punching machine. Means /Measures to be detailed out.	
3.0	THICKNESS RANGE	
3.1	The offered equipment should be capable of punching metallic samples as thick as 150 microns.	
4.0	CUTTING MECHANISM	
4.1	Preferred to have Spring Loaded Piston design mechanism, for ensuring no plastic deformation of the sample disk during and after punching operation.	
5.0	OTHER FEATURES	
5.1	The cutting / punching operation should be independent of the user.	
6.0	SPARES & CONSUMABLES	
6.1	All spares and consumables required for 24 months functioning of the offered equipment have to be necessarily listed and quoted with unit rate . The normal usage rate has to be indicated by the OEM, based on the field experience.	
7.0	GUARANTEE	
7.1	Vendors shall provide a guarantee for 12 months from the date of commissioning of the equipment or 18 months from the date of supply, whichever is earlier.	
8.0	TRAINING	
8.1	The OEM's service engineer has to impart training to BHEL Staff in the safe operation of the offered equipment for two days.	

CC.	SPECIMEN LAPPING AND DISK GRINDING KIT [Item No.3]	
S. No.	PARTICULARS AND BHEL SPECIFICATIONS	BIDDER's OFFER [Supported with Technical Details]
1.0	DISK GRINDER	
1.1	BIDDER has to quote for suitable number of disk grinders for uniformly thinning the disk shaped specimens of 3 mm diameter to parallel sided ones.	
2.0	THICKNESS MEASUREMENT	
2.1	Suitable Mechanism to be provided on/along with the offered disk grinder, for continuously monitoring the thickness of the samples using a thickness measurement unit with a scale having atleast 10 microns thickness indicators.	
3.0	SPECIMEN LAPPING KIT	
3.1	The Lapping Unit should have a heavy metal base with three numbers of extremely flat glass plates for accurate lapping needs. The OFFER should include 100 numbers of lapping sheets / disks of grit sizes 5 microns, 15 microns and 40 microns (100 Nos. for each type) with unit rate.	
4.0	ACCESSORIES	
4.1	BIDDER has to supply : Solid metal mounting cylinders - 8 Nos.; Mounting wax – 12 Units ; Tweezers for handling thin samples - 2 Nos, ; Compatible hot plate for mounting and removal of samples - 1 No..	
5.0	SPARES & CONSUMABLES	
5.1	All spares and consumables required for 24 months functioning of the offered equipment have to be necessarily listed and quoted with unit rate . The normal usage rate has to be indicated by the OEM, based on the field experience.	
6.0	GUARANTEE	
6.1	Vendors shall provide a guarantee for 12 months from the date of commissioning of the equipment or 18 months from the date of supply, whichever is earlier.	
7.0	TRAINING	
7.1	The OEM's service engineer has to impart training to BHEL Staff in the safe operation of the offered equipment for two days.	

DD.	DIMPLER UNIT AND CONSUMABLES [Item No. 4]	
S. No.	PARTICULARS AND BHEL SPECIFICATIONS	BIDDER's OFFER [Supported with Technical Details]
1.0	SAMPLE SIZE	
1.1	The offered equipment shall be suitable for 3 mm dia. disk shaped samples.	
2.0	FEATURE REQUIREMENTS	
2.1	The offered equipment shall be capable of dimpling upto less than 20 microns with auto termination and depth measurement system along with binocular microscope / stereomicroscope for viewing the sample surface after dimpling .	
3.0	GRINDING AND POLISHING WHEELS & RINGS	
3.1	BIDDER has to supply : Soft (Phosphor Bronze) spherical 2 mm wide grinding wheel - 25 Nos. ; Polishing wheel - 10 Nos.; Felt polishing ring - 100 Nos. ; Hard (Stainless Steel) spherical 3 mm wide grinding wheel - 20 Nos.	
4.0	CONSUMABLES	
4.1	BIDDER has to supply: Alumina suspension (0.05 microns) - 3 x 50ml ($\pm 20\%$); 0-2 microns polishing compound syringe (Diamond/Cubic Boron Nitride)-5 Nos; 2-4 microns polishing compound syringe (Diamond/Cubic Boron Nitride)-5 Nos; 4-6 microns polishing compound syringe (Diamond/Cubic Boron Nitride) -5 Nos	
5.0	SPARES	
5.1	All spares required for 24 months functioning of this equipment have to be listed and quoted with unit rate.	
6.0	GUARANTEE	
6.1	Vendors shall provide a guarantee for 12 months from the date of commissioning of the equipment or 18 months from the date of supply, whichever is earlier.	

EE.	LOW SPEED DIAMOND SAW [Item No.5]	
S. No.	PARTICULARS AND BHEL SPECIFICATIONS	BIDDER's OFFER [Supported with Technical Details]
1.0	SCOPE	
1.1	To supply STRUERS make Low Speed Precision Cut-Off Machine for sectioning all type of material for TEM microscopic analysis	
2.0	SPECIMEN SIZE	
2.1	Maximum size required is 30 mm in diameter. BIIDER to specify the size range of the offered equipment.	
3.0	ELECTRIC POWER SUPPLY	
3.1	Input Power Supply (by BHEL) : $230 \pm 10\%$ Volts, 50 ± 3 Hz, Single Phase AC through a 3 wire system. Necessary adapters (if any) have to be provided along with the equipment.	
4.0	SPECIMEN HOLDER	
4.1	1. For general use. Vice type with max. opening 25 mm / 1". 2. For long specimens. Double parallel vice with max. opening 25 mm / 1". 3. For round specimens. Max. opening 30 mm dia. 4. For irregularly-shaped specimens. With 5 screws. Max. opening 30 mm. 5. For adhesive mounting of specimens. 30 x 40 mm. 6. For round specimens. Teardrop type with max. opening 20 mm dia.	
5.0	CUT-OFF WHEELS	
5.1	Offered Equipment shall be suitable for Cubic Boron Nitride (CBN) and Diamond cut-off wheels with a diameter of 75 to 127 mm and a centre bore of 12.7 mm	
6.0	CONSUMABLES AND SPARES	
6.1	To quote for Coolant Fluid in Bottles of 500 ml / 1000 ml - 5 Nos., Diamond/CBN Cut Off Wheel 3 inch size : 20 Nos., Dressing Stick : 20 Nos.	
7.0	GUARANTEE	
7.1	Vendors shall provide a guarantee for 12 months from the date of commissioning of the equipment or 18 months from the date of supply, whichever is earlier.	
8.0	DOCUMENTATION	
8.1	Operation and Maintenance Manual including wiring diagrams, trouble shooting and spare part list, shall be supplied in Hard Copies (THREE Sets with the M/c.)	

FF.	ULTRASONIC CUTTER WITH CROSS SECTION KIT [Item No. 6]	
S. No.	PARTICULARS AND BHEL SPECIFICATIONS	BIDDER's OFFER [Supported with Technical Details]
1.0	SCOPE	
1.1	BIDDER to offer suitable make of Ultrasonic Cutter to make holes, unique shapes or to cut TEM microscope disc from hard and brittle materials.	
2.0	SPECIMEN SIZE	
2.1	Suitable to make samples with <1 – 10 mm size and thickness of < 0.04- 5 mm	
3.0	BASIC UNIT WITH STEREO MICROSCOPE AND ACCESSORIES	
3.1	Ultrasonic Cutter to have the basic configuration and shall include the following: 1. Stereo microscope with viewing lamp and X,Y positioning table for alignment 2. Slurry retaining ring 3. 3 mm cutting tool 4. Rectangular cutting tool 4 mm x5 mm and or bigger 5. 8 mL of (320) cutting grit 6. Wax rods (x5)	
4.0	SPARES	
4.1	BIDDER has to list down recommended / suggested including Cross Section Kit	
5.0	GUARANTEE	
5.1	Vendors shall provide a guarantee for 12 months from the date of commissioning of the equipment or 18 months from the date of supply, whichever is earlier.	

GG.	TWIN JET ELECTRO POLISHER [Item No. 7]	
S. No.	PARTICULARS AND BHEL SPECIFICATIONS	BIDDER's OFFER [Supported with Technical Details]
1.0	SCOPE	
1.1	The automatic electrolyte jet thinning equipment should be able to prepare a perforated specimen of 3 mm diameter for TEM from a sample thickness of about 0.5 mm to a thickness of less than 50 nm.	
2.0	CONTROL UNIT	.
2.1	A separate control unit should be provided incorporating power supply, programming and monitoring functions. It should have the following features: - Should have an adapter to connect to the polishing unit. - Mains voltage should be single phase, 220-240 V, 50Hz. - Output voltage should be in the range 0-120V DC. - Digital display of required parameters like current, electrolyte temperature and elapsed thinning time. - A database or manual to accommodate up to 200 user methods of electrolytic thinning for different materials. - Automatic or manual stopping of the polishing process if the temperature of the electrolyte exceeds the predetermined temperature.	
3.0	POLISHING UNIT	
3.1	The polishing unit should be compatible to the control unit and the specimen should be polished from both sides simultaneously, so that the structure is available with minimum deformation. The polishing unit should have the following features: - Should have a specimen holder for 3mm diameter and 0.5 mm thick specimens where one part of the holder should carry a platinum conductor so that electrical connection to the polishing circuit is automatically established. - Should have set of jets of 1mm diameter for thinning 3mm diameter specimens. Infrared detector to stop the thinning process automatically once the perforation appears. - All the parts, which would be in contact with chemicals, should be made of corrosion resistant material	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS	BIDDER's OFFER [Supported with Technical Details]
4.0	EQUIPMENT SIZE	
4.1	Control Unit: Width/Depth/Height/Weight : Bidder to specify these details Polishing Unit: Width/Depth/Height/Weight : Bidder to specify these details	
5.0	FUNCTIONS	
5.1	Shall be suitable to carry out Pre-thinning, Electrolytic punching, Chemical thinning, Polishing / thinning, etc.	
6.0	INPUT POWER SUPPLY	
6.1	Input Power Supply (by BHEL) : 230 $\pm$ 10% Volts, 50 $\pm$ 3 Hz, Single Phase AC through a 3 wire system. Necessary adapters (if any) have to be provided along with the equipment.	
7.0	MAIN FEATURES	
7.1	Shall have the determination of polishing voltage through built-in scan function, Automatic shut-off, etc. (Other features are to be described by the BIDDER)	
8.0	CONSUMABLES	
8.1	Shall quote for BIDDER recommended consumable items required for TWO years' operation like Perchloric Acid, etc.	
9.0	GUARANTEE	
9.1	Vendors shall provide a guarantee for 12 months from the date of commissioning of the equipment or 18 months from the date of supply, whichever is earlier.	
10.0	DOCUMENTATION	
10.1	Operation and Maintenance Manual including wiring diagrams, trouble shooting and spare part list, shall be supplied in Hard Copies (THREE Sets with the M/c.)	

HH.	PRECISION VERTICAL DIAMOND WIRE SAW [Item No. 8]	
S. No.	PARTICULARS AND BHEL SPECIFICATIONS	BIDDER's OFFER [Supported with Technical Details]
1.0	SCOPE	
1.1	The offered Precision Vertical Diamond Wire Saw shall be suitable for cutting metals, semiconductor, ceramic, glass, silicon carbide, Sapphire and composite materials.	
2.0	VERTICAL DIAMOND WIRE SAW	
2.1	The offered Diamond Wire Saw shall have the following features : 1. Smooth, sharp-edged cut surfaces 2. Vertical arrangement of the Wire Linear Feed - 60 mm or more 3. Variable wire speed 4. Automatic shut-down of the saw upon termination of cutting or in the event of wire breakage 5. Equipment for operation with cutting fluids 6. Easy servicing and largely maintenance free features 7. The specimen holder should be situated inside the wire loop such that it can serve as a reference while the specimen can be turned 8. Other accessories of 120 m diamond wire spool with size suitable and suitable winding device need to be quoted with unit rate.	
3.0	INPUT POWER SUPPLY	
3.1	Input Power Supply (by BHEL): $230 \pm 10\%$ Volts, 50 ± 3 Hz, Single Phase AC through a 3 wire system. Necessary adapters (if any) have to be provided along with the equipment.	
4.0	CONSUMABLES/ SPARES	
4.1	The BIDDER shall provide the list of spares / consumables required for the uninterrupted operation of the equipment for a period of THREE years. To give the unit rate for these suggested items.	
5.0	DOCUMENTATION	
5.1	Operation and Maintenance Manual including wiring diagrams, trouble shooting and spare part list, shall be supplied in Hard Copies (THREE Sets with the M/c.)	
6.0	GUARANTEE	
6.1	Vendors shall provide a guarantee for 12 months from the date of commissioning of the equipment or 18 months from the date of supply, whichever is earlier.	

II.	PLASMA CLEANER [Item No. 9]	
S. No.	PARTICULARS AND BHEL SPECIFICATIONS	BIDDER's OFFER [Supported with Technical Details]
1.0	SCOPE	
	The plasma cleaning system should be of advanced class for use to enhance both imaging and microanalysis by removing organic (carbonaceous) contamination from TEM/SEM specimens, specimen holders, grids & bulk objects	
2.0	PLASMA SOURCE	
	a) The system shall have a low energy glow discharge ion source creating hydrogen and oxygen radicals. b) Cleans highly contaminated specimens in TWO minutes or in still less time. Cleaning time information must be mentioned in brochure. c) Flow rate shall be factory set and shall be adjusted through a potentiometer located on the service panel. d) The RF Plasma Source shall be CE Certified.	
3.0	VACUUM	
	a) Must be an oil free vacuum system consisting of a turbo-molecular drag pump backed by a multistage diaphragm pump for contamination free processing. b) The pumping system shall pump down the system in less than two minute. c) Vacuum must be sensed by a Pirani Gauge. d) Must attain the vacuum level around 5×10^{-6} mbar.	
4.0	INPUT ELECTRICAL POWER SUPPLY	
	Input Power Supply (by BHEL): 230 $\pm$ 10% Volts, 50 $\pm$ 3 Hz, Single Phase AC through a 3 wire system. Necessary adapters (if any) have to be provided along with the equipment. NOTE : If required a 415 $\pm$ 10% Volts, 50 $\pm$ 3 Hz, 3 Phase supply through a 4 wire system is possible by BHEL.	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS	BIDDER's OFFER [Supported with Technical Details]
5.0	CHAMBER & SAMPLE HOLDER PORT	
	The following features shall be necessarily addressed to : a) At least two ports shall be available to accept all side entry TEM holders with most of the varieties. b) Quartz and stainless steel chamber shall be specifically designed for TEM Specimen / holder processing. c) Chamber lid has to provide access for bulk objects of size at 80 mm or more. The chamber shall contain a load lock for rapid throughput applications. d) Pump down time shall be less than 50 seconds & venting time shall be less than 5 seconds. e) A viewport shall be provided for chamber observation. f) Specimen interface shall allow for rapid holder insertion requiring no tools or external clamps. g) Specimen Holder Ports shall be compatible with most TEM specimen holders. h) Specimen Holder Ports should be secured to the main housing by a bayonet style mount to facilitate interchangeability without the need for tool.	
6.0	GAS CONTROLS	
	The below listed functions shall form part of the system ; a. A Gas Flow Controller shall form part of the system . b. The system shall support a minimum of two gases - these should include either Argon, Hydrogen or Oxygen. c. The gas flow should be controlled by embedded Mass Flow Controllers (MFC). The system shall be capable of cleaning with minimal plasma damage. d. The system shall be capable to clean holey carbon grids without damaging them. e. Data supporting unit should be included along with the OFFER. f. The system venting sequence shall be independently interlocked.	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS	BIDDER's OFFER [Supported with Technical Details]
7.0	PLASMA POWER SOURCE	
	a. The Plasma Powersource shall be of High Frequency type (around 10 to 15 MHz frequency) – Bidder to specify the exact operating frequency in the offered equipment. b. BIDDER to specify the forward power rating. c. High Frequency power control output shall be optimized with an automatic matching network. d. The system should not demand any user intervention . e. The High Frequency electrode must consist of a copper antenna located outside the plasma chamber in order to eliminate the possibility of electrode material sputtering onto the specimen. f. Other features of the offered plasma system shall be enlisted with details	
8.0	CONTROLS	
	a. The operation shall be either in TEM or custom mode. b. TEM mode shall be fully automated for optimal processing conditions with the only variable being time. c. The custom mode shall allow the establishment of process time, plasma power, vacuum level, gas mixing selection, ratios and flow rate. d. Recipe storage and recall capabilities should be standard. e. The system shall be accessible via the Internet for remote diagnostic purposes. f. Help menu shall be available within the control module as standard module. g. The termination program shall be fully automatic. h. The processing time has to be controlled and displayed through the Touch Screen Display. i. Safety interlocks should ensure the linkage between the enclosure panels, High Frequency Unit, gas, and vacuum to prevent operation without the existence of appropriate processing conditions.	

S. No.	PARTICULARS AND BHEL SPECIFICATIONS	BIDDER's OFFER [Supported with Technical Details]
9.0	USER INTERFACE	
	a. The User Interface shall be a touch screen type. b. The programming shall be through the embedded module with customizing the parameters. c. Operation shall be either in TEM or custom mode. The TEM mode is fully automated for optimal processing conditions with the only variable being time. d. Custom mode allows the establishment of process time, plasma power, vacuum level, gas mixing selection, ratios and flow rate. e. The system shall have two USB ports. f. Recipes shall be available using mixtures of the three gases. g. There shall be facility for recipe storage and recall capabilities. h. Shall be accessible through the Internet for remote diagnostic purposes. i. Help menu shall be available within the control module. j. Termination shall be fully automatic. k. Processing time need be controlled / displayed through the touch screen.	
10.0	CONSUMABLES/ SPARES	
10.1	The BIDDER shall provide the list of spares / consumables required for the uninterrupted operation of the equipment for a period of THREE years. To give the unit rate for these recommended items.	
11.0	ERECTION/INSTALLATION & COMMISSIONING AND TRAINING	
11.1	Erection and Commissioning or Installation has to be done at Welding Research Institute, BHEL Tiruchirappalli/INDIA, by the OEM or their authorized service agency/ personnel. All the cables and adapters required for integration of the equipment have to be supplied along with the equipment. Appropriate training need to be imparted to BHEL Staff for THREE days in O&M.	
12.0	DOCUMENTATION	
12.1	Operation and Maintenance Manual including wiring diagrams, trouble shooting and spare part list, shall be supplied in Hard Copies (THREE Sets with the M/c.)	
13.0	GUARANTEE	
13.1	Vendors shall provide a guarantee for 12 months from the date of commissioning of the equipment or 18 months from the date of supply, whichever is earlier.	

	Annual Maintenance Contract (AMC) :	
	[optional and Request to send in separate sealed bid) AMC charges for the following equipments with all accessories for 3 years beyond the warranty period have to be quoted per year in % of the order value of the supplies effected. These charges have to be valid for 3 years beyond the standard warranty period. BHEL reserves the right to place a separate order/ orders for AMC contract for 3 years and/ or part thereof before expiry of standard warranty period at the rates quoted. Equipments a) Ion beam Milling equipment b) Dimpler unit c) Low speed diamond saw - d)Twin Jet Electro Polisher e) Plasma Cleaner f) Precision vertical diamond wire SAW AMC Charges should be quoted as follows: AMC Charges after 1st year:_____ % AMC Charges after 2nd year:_____ % AMC Charges after 3rd year:_____ %	