

**H.E.J. RESEARCH INSTITUTE O CHEMISTRY  
INTERNATIONAL CENTER FOR CHEMICAL AND BIOLOGICAL SCIENCES  
UNIVERSITY OF KARACHI  
KARACHI-75270**

**TENDER NOTICE NO. HEJ-XRD-200514**

Sealed tenders are invited from the sales tax registered firms with Sindh Revenue Board and income tax department for Supply & Installation of X-ray Diffractometer System (Powder application) & X-ray Diffractometer (Single Crystal application) from the authorized dealers on C&F basis for the Center on **2-envelope** procedure basis.

The tender documents can be collected from Purchase Office of the Center, on any working day between 9.00 a.m. to 12.30 p.m., from the date of publication of the advertisement in the newspapers or notification of this advertisement on the websites, on payment of Rs. 300/- (non-refundable), in shape of a pay order (Demand Draft by the out of Karachi suppliers), in favor of the Director, H.E.J., or downloaded from the websites [www.iccs.edu](http://www.iccs.edu), [www.pprasindh.gov.pk](http://www.pprasindh.gov.pk). The last date of issuing the tender documents is 19-05-2014 The tenders can be submitted with 2% of the bid value as earnest money in shape of a pay order in favor of the Director, H.E.J., latest by 2.30 p.m. on 20-05-2014. Only technical offers of the tenders will be opened in Meeting Room of the Center at 3.00 p.m. on the same day in presence of the bidders or their representatives. The Procuring Agency may reject all or any bid subject to the relevant provision of SPP Rules.

For any information and detail:

Contact:

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***DIRECTOR***

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Contact Person for Technical Information  
**Mohammad Saad Ahmed**  
Tel # UAN 111-222-292 (114)

**LIST OF EQUIPMENTS**

<b>S.NO.</b>	<b>ITEM</b>	<b>SPECIFICATIONS</b>	<b>QTY</b>	<b>ESTIMATED COST</b>
1.	X-ray Diffractometer System (Powder application)	Separate sheet enclosed	1	Rs. 18.5 million
2.	X-ray Diffractometer (Single Crystal Application)	“do”	1	Rs. 56.0 million

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**TECHNICAL SPECIFICATIONS OF X-RAY DIFFRACTOMETER  
SYSTEM (POWDER)**

To record spectral data for desired duration over the specified angular range and angular step.

It must be radiation safe spectrometer. Equipped with safety protections for radiation.

The system shall support both focusing (Bragg-Brentano) geometry.

Should perform complete unattended operations.

Flawless safety mechanism against over-voltage, over-power, over-current, over-load, abnormal input mains voltage, or temperature. Interlock on operation panel etc.

for Generator unit.

The specifications and configuration of X-Ray Diffractometer System are as follows:

**(1) X RAY TUBE**

X-ray tube must be long fine focus and Cu anode Ceramic X-ray tube with K $\beta$  filter, power 2 kW or more (50 kV, 40 mA) or better.

**(2) X-RAY GENERATOR UNIT**

Generator compatible to power the X-ray tube to its full capacity with ability to vary voltage and current in suitable steps. Provide proper the step size and the minimum values of voltage and current. HT Stability better than +/-0.01% for Mains stability +/- 10 %.

Microprocessor controlled x-ray generator, including radiation enclosure, with following specifications

Maximum output power	: 3.0 kW
Maximum high voltage	: 60 kV
Maximum anode current	: 60 mA
Stability	: <0.005% at 10% power fluctuation

### **(3) GONIOMETER**

High Precision, vertical type Goniometer with theta-theta or theta-2theta geometry. The Goniometer should be equipped with suitable slit assembled both on the primary and Secondary sides to enhance overall performance. Achievable peak width should be <0.05deg or better. Usable angular range 0 deg. to 160 deg or better and accuracy should be +/- 0.02deg or better.

**Mode of operation**                      Theta – Theta operation

**Operation**                                      Vertical

**Accuracy**                                      should be +/- 0.02deg or better.

### **(4) DETECTOR SYSTEM**

Solid state Detector for x-ray diffraction suitable for most diffraction experiments with long life time and maintenance free (with all necessary accessories) and the detector accept any wavelength of any radiation type.

### **(5) SAMPLE STAGE**

Rotating Sample Stage with spinner (variable speed option) with suitable sample holders for powder samples. The system should be compact and easy to move other places.

### **(6) COMPUTER SYSTEM**

Branded from the factory with licensed software.

### **(7) INSTALLATION & COMMISSIONING**

By factory Engineer of the principal

### **(8) TRAINING**

Comprehensive operation and maintenance trainings at the supplier facility.

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**TECHNICAL SPECIFICATIONS OF X-RAY DIFFRACTOMETER SYSTEM  
(SINGLE CRYSTAL)**

Tender is invited from the qualified vendors for the supply of floor mounted single crystal X-ray diffractometer for a wide range of chemical, biological, physical and materials science single crystal diffraction studies.

The equipment should offer flexibility to address a wide range of studies including extremely small and weakly diffracting crystals, crystals with significantly large unit cells (~50 Å) and with additional complexities in terms of twinning, disorder etc.

The system offered should be complete with all respect so that it can be used with both Mo and Cu radiation for single crystal XRD data collection. The details of the required specifications are given below.

### **1. X RAY TUBE**

X-ray tube with ceramic fine focus for both Cu and Mo.

### **2. X-RAY GENERATOR UNIT**

Generator compatible to power the X-ray tube to its full capacity with ability to vary voltage and current in suitable steps. Provide proper the step size and the minimum values of voltage and current. HT Stability better than +/-0.01% for Mains stability +/- 10 %. Microprocessor controlled x-ray generator, including radiation enclosure, with following specifications

Maximum output power : 3.0 kW

Maximum high voltage : 60 kV

Maximum anode current : 60 mA

Stability : <0.005% at 10% power fluctuation

### **3. GONIOMETER**

The goniometer should be equipped with four circle geometry. The four angles phi, omega, theta, kappa with the sphere of all axes coinciding within ten micro-meters. Resolution on each circle should be better than 0.005°.

#### **4. DETECTOR**

CCD based X-ray detector for single crystal frame data collection suitable for both Mo and Cu radiation with large active area, high sensitivity (minimum 160 eV or higher per Mo photon), fast effective read out rate of minimum 4 MHz.

For rapid data collections, speediest read out of the CCD detector is desired, with a readout time of 0.75 sec.

The active area or the aperture of the camera should be at least 60 X 60 mm (or equivalent) or better.

The detector should be air cooled independently using an inbuilt cooler.

#### **5. COOLING UNITS**

Appropriate high quality chillers for X-ray tubes should be quoted –water/air/JT chillers. The chiller units should be compact and should be of lowest maintenance requirements.

The unit should give good temperature stability, low consumption of supply water and automatic refill of the enclosed circuit water (for water based coolers).

#### **6. LOW & HIGH TEMPERATURE ATTACHMENT**

Low & high temperature attachment working from 80K to 500K range or better range with a stability of +/-1 K or better over the whole temperature range should be quoted. Low temp. Attachment should be with very low liquid N<sub>2</sub> consumption, no icing effect, equipped with liquid N<sub>2</sub> Dewar of minimum 60 liters capacity or more. Additionally Dewar(s) having storage capacity of 200 liters of liq. N<sub>2</sub> with auto transfer facility must be quoted.

The required pressure regulators, valves, transfer line, line heater and other necessary accessories should be quoted. Auto transfer facility for the Dewars should be quoted.

Necessary trolleys for the liquid N<sub>2</sub> Dewars, pressure regulators etc should be quoted.

#### **7. APPLICATION SOFTWARE**

The vendor should offer the latest version of their Windows based complete package of software required for the instrument control and monitoring, data collection, data processing, structure solution and refinement and publication data generation. The software should be on GUI platform and should be applicable for the instrumental control and data collection for single crystal, twins, low/high temperature, high pressure, charged density and modulated structure. The software should be able to perform complete data acquisition, scaling, absorption correction, space group determination, structure solution and refinement, and final crystallographic information file (cif file) generation for publication purpose. The software shall allow easy change of exposure time, scan range, scan width and detector distance and provide automatic re-measurement of overflow frames, automatic dark image acquisition and optional reference frames for tracking decaying samples.

An unlimited number of data integration and analysis software licenses should be available. Thus all local and remote dependents of the equipment should have the capability to analyze the data independently.

Software for Auto Structure solution is required.

No public domain software is acceptable. Manufacturer must offer their latest version of licensed software developed by them. There must be an undertaking that updates to the instrument control/data collection and automated structure solution and refinement software will be provided as available free of charge and in perpetuity.

The offered data acquisition software package must be compatible with SHELX and WINGX.

## **8. COMPUTER AND PRINTER:**

Minimum specifications of the PCs are:

Licensed Windows 7 operating system. Intel i7 CPU-4 cores, 2.93 GHz or better, 16 GB RAM, 64-bit Operating System, 1 TB HDD or higher with 7200 rpm. Intel Mother board, Nvidia graphics card with 1GB memory. DVD Read and Write facility. Latest LCD monitors 21inch or better. Wireless keyboard and mouse and other essential accessories.

2Nos of PCs with above configurations should be quoted.

Laser printer, 2 TB external HDD for data back-up

## **9. MANUALS, CIRCUIT DIAGRAMS AND INSTRUCTION SHEETS:**

All the manuals including circuit diagrams and instruction sheets must be supplied in English for the purpose of Service Engineers reference.

## **10. TEST CRYSTAL:**

One test crystal should be included.

## **11. INSTALLATION & COMMISSIONING**

By factory Engineer of the principal

## **12. TRAINING**

Comprehensive operation and maintenance trainings at the supplier facility

## **OPTIONALS**

## **13. CRYSTAL MOUNTING ACCESSORIES**

1. Capillaries made of special glass with wall thickness of 0.01 mm and outer diameter of 0.2 mm, 0.3 mm, 0.5 mm, 0.7mm, 1.5 mm –100 pcs of each type and other necessary capillaries/accessories

**14. MICROSCOPE:**

A good quality stereo microscope with Polarizer/Analyzer to view the crystal while mounting should be quoted separately. It should have transmitted as well as reflected cold light source. A CCD camera should be integrated to this microscope. This camera should have USB connectivity and the data should be transferable to PC. Any required software for this should be quoted.

**15. EXTENDED WARRANTY:**

The complete single crystal X-ray Diffractometer system including X-ray tube, chillers, quoted should quoted extended warranty per from the date of installation



**SUMMARY SHEET**

**The tender will liable to be rejected if this form will not accompan<sup>y</sup> the tender bid / quote**

<b>SERIAL No.</b>	<b>BID VALUE</b>	<b>FOREIGN CURRENCY</b>	<b>CONVERSION RATE</b>	<b>PRICE IN PKR</b>

<b>TOTAL BID VALUE IN PKR</b>		
<b>Earnest Money @ 2% in PKR</b>		
<b>Payorder / Bank Draft No:</b>		<b>Date:</b>
<b>Signature</b>	<b>Seal:</b>	