

# XRD Equipment Specification

Qty: 01

1	<b>X-ray Safety</b>	<ul style="list-style-type: none"> <li>❖ Radiation Enclosure with secure Closure</li> <li>❖ Radiation outside the closure be less than 1 <math>\mu\text{Sv/hr}</math>.</li> <li>❖ X-ray generated only when door is closed</li> <li>❖ Front door with Lead Glass</li> </ul>
2	<b>X-Ray Generator</b>	<ul style="list-style-type: none"> <li>❖ Max. Voltage: 60 KVA (1 KV/Step), Max Current: 60 mA (1 mA/Step.) Stability <math>\leq 0.01\%</math></li> <li>❖ Voltage and current: Reproducibility <math>&lt; 0.001\%</math></li> <li>❖ Electrical characteristic: AC 220 Volts <math>\pm 10\%</math>, single Phase, 50 Hertz</li> <li>❖ Water flow Management with safety</li> <li>❖ Security loop automatically closes tube shield shutter and stop x-ray tube operation</li> <li>❖ Safety loop automatically Shut down/alarm the device when over load, high/low voltage, high/low current, Water flow problem, x-ray tube over temperature etc.</li> <li>❖ Tube housing with filter dials and automatic window shutter.</li> <li>❖ High voltage cable</li> <li>❖ X-Ray tubes copper (Cu) &amp; Cobalt (Co) wavelength               <ul style="list-style-type: none"> <li>❖ Long Fine Focus, Power 3000 watt (max), Nature glass or ceramic</li> </ul> </li> </ul>
		<b>Water Chiller</b> <ul style="list-style-type: none"> <li>❖ Suitable and compatible water cooling system with minimum Noise</li> <li>❖ Flow = 3.5 L/min &amp; Temperature control = 18-25 <math>^{\circ}\text{C}</math></li> </ul>
3	<b>Goniometer</b>	<ul style="list-style-type: none"> <li>❖ Goniometer with vertical <math>\theta</math>- <math>\theta</math> configuration (sample is fixed)</li> <li>❖ Vertical Mounting with horizontal sample position</li> <li>❖ Angular range -110 ~ +160 2theta, Radius 250 mm</li> <li>❖ Min step angel 0.0001<math>^{\circ}</math>, 2<math>\theta</math> repeat accuracy <math>\leq 0.0005^{\circ}</math>, Measurement accuracy <math>\leq 0.001^{\circ}</math></li> <li>❖ Exchangeable sample stages with no alignment</li> <li>❖ Divergence and solar slits, Programmable optics with all necessary modules</li> <li>❖ Monochromatic compatible with all wavelength</li> <li>❖ K<math>\beta</math> ray elimination, K<math>\alpha</math>1 &amp; K<math>\alpha</math>2 separation</li> </ul>
4	<b>Sample stage</b>	<ul style="list-style-type: none"> <li>❖ Flat Powder Sample Stage</li> <li>❖ Mono capillary sample stage with its complete accessories (Alignment camera and software tools for easy and accurate sample positioning.</li> <li>❖ Micro diffraction stage for small section of large sample.</li> <li>❖ <b>Optional:</b> Texture stage with all accessories &amp; software's</li> </ul>
5	<b>Sample Holder system/ Standard Samples</b>	<ul style="list-style-type: none"> <li>❖ Fixed, with or without sample rotation</li> <li>❖ Different Sample Holders (Few grains, small powder sample, irregular shape metal sample, Clay samples, Multi-purpose sample holder etc.)</li> <li>❖ Automatic Sample Changer with at least 10 sample loading in one time</li> <li>❖ Reference Powder Sample for instrument calibration</li> <li>❖ CeO<sub>2</sub> (Powder) Mineral for Size Stain Analysis</li> </ul>
6.	<b>Detectors System</b>	<ul style="list-style-type: none"> <li>❖ Solid State, No gas</li> <li>❖ Fast detection over 2-theta range, radius 250mm</li> <li>❖ High efficiency, High signal counts &amp; no additional system maintenance required</li> <li>❖ High Resolution detector with lower energy threshold setting to spread fluorescent</li> <li>❖ low background <math>&lt; 0.5</math> CPS overall</li> <li>❖ Supported wavelength Cu, Co, Mo, Fe,</li> <li>❖ Angular reproducibility <math>\pm 0.001^{\circ}</math></li> </ul>

		<ul style="list-style-type: none"> <li>❖ Required application               <ul style="list-style-type: none"> <li>❖ Phase identification, Standard-less quantification, Texture Studies, Crystallography and non-Ambient studies on flat powder samples</li> <li>❖ Analysis of samples in glass capillaries</li> <li>❖ Micro-diffraction</li> <li>❖ Rietveld Analysis</li> </ul> </li> </ul>
7.	<b>Software</b>	<ul style="list-style-type: none"> <li>❖ Operational software for automatic control of all features of the equipment</li> <li>❖ Diagnostic software for troubleshooting</li> <li>❖ Analytical software include following features               <ul style="list-style-type: none"> <li>❖ Fast multiple phase identification from powder diffraction data</li> <li>❖ Automatic residual searching with respect to identified phase</li> <li>❖ Automatic raw data processing including peak searching, profile fitting and 2theta correction</li> <li>❖ Best Profile fitting features</li> <li>❖ Semi Quantitative analysis</li> <li>❖ Perform rietveld refinement Quantitative analysis</li> <li>❖ Compatible with license ICDD and open data base COD</li> </ul> </li> <li>❖ <b>Optional:</b> Mineral Powder diffraction Search Manual JCPDS ICDD Book</li> </ul> <p><b><u>Crystallographic database:</u></b></p> <ul style="list-style-type: none"> <li>❖ Open data base COD, Free of charge, unlimited license, permanent validity, open access collection for crystal structure of Minerals, Inorganic, Organic and Metals</li> <li>❖ <b>Optional</b> ICDD license data base (latest) including all mineral, compounds data for at least ten years license</li> </ul>
8.	<b>Computer</b>	<ul style="list-style-type: none"> <li>❖ Latest( best possible specification) PC for operational and analytical software of the equipment</li> </ul>
9.	<b>UPS</b>	<ul style="list-style-type: none"> <li>❖ Suitable UPS 15KVA with 15-20 min back up for XRD equipment &amp; Chiller</li> </ul>
10	<b>Installation and training</b>	<ul style="list-style-type: none"> <li>❖ Delivery and installation of the system will responsibility of the supplier</li> <li>❖ The supplier will provide complete onsite training of operation and Application to the three (03) scientists/ engineers</li> <li>❖ The Purpose of this training is to ensure that the trained people will:               <ul style="list-style-type: none"> <li>❖ Work Safety</li> <li>❖ Be able to use properly the diffraction equipment and software</li> <li>❖ Be able to solve common issues (Calibration, alignment, etc.)</li> <li>❖ Be able to obtain the best result possible with standard equipment</li> </ul> </li> </ul>
11	<b>Documentation</b>	<ul style="list-style-type: none"> <li>❖ Complete manuals of operation, service and diagnostic (hard &amp; soft copy)</li> <li>❖ User manual of all the software related to the equipment</li> </ul>
12	<b>Warranty and support</b>	<ul style="list-style-type: none"> <li>❖ A comprehensive Five (05) years warranty must be included with the system (03 years with parts &amp; 02 years' service warranty)</li> <li>❖ The period of the warranty shall begin upon full installation and acceptance of system</li> <li>❖ An agreement with the manufacturer to supply support and necessary spare parts or suitable replacement or up gradation for the supplied equipment at reasonable price for a period of ten (10) years from the delivery of the system</li> </ul>
13	<b>Spare Parts</b>	<ul style="list-style-type: none"> <li>❖ Copper (Cu) &amp; Cobalt (Co) X-ray Tube</li> <li>❖ Supported Electronic Cards, HT Cable, Goniometer motors, Greasing Compounds, Tool kit, Fuses, Bulbs and other necessary spare parts etc.</li> </ul>