Technical specification - RFQ 3-2026

No	Technical Specification	Supplier offered specification	Compliant (yes/No)	Remarks / Deviation Details	Supporting Document
1	**Ophthalmology Operating Microscope**				
	1. General Description				
	The **Ophthalmology Operating Microscope** shall be a **high-precision binocular surgical microscope** designed for:				
	Ophthalmic surgeries including cataract, glaucoma, retinal, and corneal procedures				
	Microsurgical procedures requiring high magnification and illumination				
	Adult and pediatric ophthalmic patients				
	The system shall provide **excellent optical quality, ergonomic operation, and integrated illumination** to ensure surgical precision and patient safety.				
	2. Scope of Supply				
	The microscope system shall include, but not be limited to:				
	2.1 Optical Components				
	Binocular head with adjustable interpupillary distance				
	Magnification changer (continuous or step-wise)				
	Objective lenses with adjustable working distance				
	High-resolution optics with distortion-free image				
	2.2 Illumination System				
	Integrated LED or Xenon light source				
	Adjustable illumination intensity				
	Coaxial illumination for shadow-free field				
	Fiber optic or built-in illumination cable				
	2.3 Stand and Mobility				
	Floor stand or ceiling-mounted configuration				
	Smooth, multi-directional movement				
	Lockable brakes or stabilizers for safety				
	Ergonomic arm for surgeon comfort				
	2.4 Camera and Documentation (Optional)				
	Integrated HD/4K camera				
	Video output for recording and teaching				
	Footswitch control for focus, zoom, and camera functions				
	2.5 Accessories				
	Sterilizable or autoclavable handles				
	Auxiliary lenses (as applicable)				
	Footswitch for hands-free operation				
	Protective dust cover and storage case				
	3. Technical Specifications				
	3.1 Optical				
	Magnification range: ≥4× to 25×				
	Zoom: Continuous or step-wise				
	Field of view: Wide enough for microsurgical visualization				
	Working distance: Adjustable 150–400 mm depending on objective lens				
	3.2 Illumination				
	LED/Xenon light source, ≥50,000 lux intensity				
	Coaxial and optional oblique illumination				

	Adjustable brightness via control panel or footswitch				
	3.3 Ergonomics & Operation				
	Smooth rotation, tilt, and focus				
	Counterbalanced arm for minimal drift				
	Hand and foot controls for focus, zoom, and illumination				
	Compatible with surgical microscope accessories				
	4. Sterilization & Infection Control				
	Autoclavable handles and accessories				
	Smooth, cleanable surfaces				
	Compatible with hospital infection control protocols				
	5. Standards & Compliance				
	The system shall comply with:				
	ISO 13485 (Medical Device Quality Management System)				
	IEC 60601-1 (Electrical Safety)				
	IEC 60601-2-13 (Particular requirements for microscopes)				
	CE Marking and/or FDA Approval				
	6. Safety Requirements				
	Electrical and optical safety per IEC standards				
	Anti-glare, heat-reducing illumination				
	Stable stand or ceiling mount with anti-tip protection				
	Emergency stop or power cutoff for light source				
	7. Packaging & Labeling				
	Supplied in protective packaging				
	Each component labeled for easy installation				
	Instructions for setup, calibration, and use				
	8. Maintenance & After-Sales Service				
	Warranty: minimum **24 months**				
	Availability of spare parts and technical support				
	Preventive maintenance and calibration services				
	9. Documentation				
	Supplier shall provide:				
	User Manual and Service Manual				
	Technical Datasheet / Catalog				
	Certificate of Conformity / CE / FDA				
	Packing List and Warranty Certificate				
	10. Training				
	On-site training for surgeons, nurses, and biomedical staff				
	Instructions for operation, cleaning, sterilization, and maintenance				
2	**A-Scan Ultrasound Biometer (AB Scan) – Ophthalmology**				
	1. General Description				
	The **A-Scan Biometer (AB Scan)** shall be a **high-precision ophthalmic diagnostic device** designed for:				
	Measuring axial length of the eye				
	Preoperative assessment for intraocular lens (IOL) calculation				
	Adult and pediatric patients				
	The device shall provide **accurate, reproducible, and reliable measurements** for ophthalmic surgeries, including cataract procedures.				
	2. Scope of Supply				
	The device shall include, but not be limited to:				

	2.1 Main Unit				
	High-resolution digital A-Scan ultrasound biometer				
	Handheld or desktop configuration				
	Integrated probe with single-use or sterilizable covers				
	Built-in measurement software for axial length, anterior chamber depth, lens thickness				
	2.2 Accessories				
	Coupling gel				
	Disposable or reusable probe covers				
	Power cable and adapters				
	Optional: Printer or digital output for report documentation				
	Protective dust cover				
	3. Technical Specifications				
	3.1 Measurement Capabilities				
	Axial length: 10–40 mm				
	Resolution: ±0.01 mm				
	Measurement modes: Contact (applanation) and optional immersion				
	Automatic averaging of multiple readings				
	Ability to calculate IOL power using built-in formulas (SRK/T, Holladay, Hoffer Q, etc.)				
	3.2 Display & Interface				
	LCD or LED display with high visibility				
	Intuitive user interface				
	Digital readout of measurements				
	Optional integration with PC or EMR system				
	3.3 Probe Specifications				
	Frequency: 10 MHz or higher				
	Ergonomic, lightweight probe				
	Sterilizable or disposable covers				
	Stable signal acquisition with minimal noise				
	3.4 Operational Requirements				
	Power supply: 220–240V AC, 50/60 Hz or as per hospital standards				
	Ambient operating temperature: 10–35°C				
	Portable and compact design for clinic or operating room use				
	4. Sterilization & Infection Control				
	Autoclavable probe covers or disposable probe covers				
	Smooth surfaces for easy cleaning				
	Compatible with hospital infection control protocols				
	5. Standards & Compliance				
	The device shall comply with:				
	ISO 13485 (Medical Device Quality Management System)				
	IEC 60601-1 (Electrical Safety)				
	IEC 60601-2-37 (Ultrasound Equipment)				
	CE Marking and/or FDA Approval				
	6. Safety Requirements				
	Non-toxic, biocompatible materials for probe				
	Electrical safety per IEC standards				
	Stable and safe probe handling to avoid ocular injury				
	Overload and short-circuit protection				
	7. Packaging & Labeling				
	Supplied in protective packaging				
	Clearly labeled components				
	Instructions for setup, operation, and maintenance				

	8. Maintenance & After-Sales Service				
	Warranty: minimum **24 months**				
	Availability of spare parts and technical support				
	Preventive maintenance and calibration services				
	9. Documentation				
	Supplier shall provide:				
	User Manual and Service Manual				
	Technical Datasheet / Catalog				
	Certificate of Conformity / CE / FDA				
	Packing List and Warranty Certificate				
	10. Training				
	On-site training for ophthalmologists, nurses, and biomedical engineers				
	Instructions for measurement procedures, probe handling, and device maintenance				
3	**Phacoemulsification (Phaco) Machine – Ophthalmology**				
	1. General Description				
	The **Phaco Machine** shall be a **high-precision ophthalmic surgical system** designed for:				
	Cataract surgery (phacoemulsification)				
	Adult and pediatric ophthalmic patients				
	Safe, efficient, and precise lens fragmentation and aspiration				
	The system shall provide **adjustable power settings, irrigation/aspiration control, and ergonomic design** to ensure surgical safety and efficiency.				
	2. Scope of Supply				
	The system shall include, but not be limited to:				
	2.1 Main Console				
	Phacoemulsification unit with digital control panel				
	Adjustable ultrasound energy modes (longitudinal, torsional, or combined)				
	Integrated irrigation and aspiration system				
	Footswitch for hands-free control				
	2.2 Accessories				
	Sterilizable handpiece(s) compatible with various tips				
	Phaco tips (straight, angled, and mini-flared)				
	Irrigation and aspiration tubing sets				
	Disposable or autoclavable fluidics sets				
	Protective dust cover and transport packaging				
	2.3 Optional Accessories				
	Integrated microscope interface				
	Digital display for fluidics and energy parameters				
	Connectivity to EMR or surgical recording systems				
	3. Technical Specifications				
	3.1 Ultrasound & Energy Delivery				
	Modes: Longitudinal, Torsional, or Combined				
	Adjustable power: 0–100% (or equivalent)				
	Pulse and burst modes for precise energy delivery				
	Safety features to minimize corneal endothelial damage				
	3.2 Irrigation & Aspiration				
	Adjustable aspiration flow: 0–50 cc/min (or as per manufacturer)				
	Adjustable vacuum: 0–600 mmHg (or equivalent)				
	Real-time fluidics monitoring				

	Occlusion-sensing and automatic vacuum control				
	3.3 Footswitch & Ergonomics				
	Multi-function footswitch: phaco, irrigation/aspiration, and coagulation				
	Ergonomic design for surgeon comfort				
	Smooth, responsive pedal action				
	3.4 Display & Interface				
	Digital touchscreen or panel for parameter control				
	Real-time monitoring of power, vacuum, and flow				
	Preset programs for different cataract types				
	4. Sterilization & Infection Control				
	Autoclavable handpieces and tips				
	Disposable or autoclavable fluidics and tubing sets				
	Smooth surfaces for cleaning and disinfection				
	Compliance with hospital infection control protocols				
	5. Standards & Compliance				
	The system shall comply with:				
	ISO 13485 (Quality Management System)				
	IEC 60601-1 (Electrical Safety)				
	IEC 60601-2-18 (Ophthalmic Surgical Equipment)				
	CE Marking and/or FDA Approval				
	6. Safety Requirements				
	Overload, overheat, and short-circuit protection				
	Safe energy delivery to minimize ocular trauma				
	Audible and visual alarms for system errors				
	Non-toxic, biocompatible materials for patient-contact components				
	7. Packaging & Labeling				
	Supplied in protective, shock-resistant packaging				
	Components labeled for easy identification and use				
	Instructions for setup, calibration, and operation				
	8. Maintenance & After-Sales Service				
	Warranty: minimum **24 months**				
	Availability of spare parts and consumables				
	Technical support for preventive maintenance, calibration, and repair				
	9. Documentation				
	Supplier shall provide:				
	User Manual and Service Manual				
	Technical Datasheet / Catalog				
	Packing List and Warranty Certificate				
	10. Training				
	On-site training for ophthalmologists, nurses, and biomedical engineers				
	Instructions for phaco settings, footswitch use, and fluidics management				
	Guidance on cleaning, sterilization, and preventive maintenance				
4	**Plastic Surgery Set (Reconstructive & Aesthetic Surgical Instruments Set)**				
	1. General Description				
	The **Plastic Surgery Set** is designed for use in:				
	Reconstructive surgery				
	Aesthetic (cosmetic) procedures				
	Microsurgical and delicate soft tissue operations				

	The set shall consist of **high-precision, reusable surgical instruments** suitable for hospital and operating theatre environments.				
	2. Scope of Supply				
	The set shall include, but not be limited to, the following instruments:				
	Cutting Instruments				
	Fine Surgical Scissors (Straight & Curved)				
	Iris Scissors				
	Metzenbaum Scissors				
	Grasping & Holding Instruments				
	Tissue Forceps (with/without teeth)				
	Adson Forceps				
	Micro Forceps				
	Clamping Instruments				
	Mosquito Hemostats				
	Small Artery Forceps				
	Needle Handling				
	Needle Holders (Fine / Micro)				
	Retractors				
	Skin Hooks				
	Small Retractors (e.g., Senn / Ragnell type or equivalent)				
	Dissection Instruments				
	Dissecting Scissors				
	Elevators				
	📌 *Suppliers may propose additional instruments required for a complete and functional set.*				
	3. Technical Specifications				
	3.1 Materials				
	All instruments shall be made of:				
	High-quality medical-grade stainless steel				
	Corrosion				
	Rust				
	Satin or matte finish to reduce glare				
	Non-magnetic (preferred for precision work)				
	3.2 Design & Precision				
	Fine, delicate tips suitable for microsurgical use				
	Ergonomic design for prolonged procedures				
	Smooth, precise alignment of jaws and tips				
	Anti-slip handles for secure grip				
	3.3 Performance Requirements				
	High precision in cutting and tissue handling				
	Minimal tissue trauma				
	Smooth operation of joints and locking mechanisms				
	Long-lasting sharpness for cutting instruments				
	3.4 Durability				
	Resistant to frequent use				
	No misalignment or loosening over time				
	Maintain performance after repeated sterilization cycles				
	4. Sterilization & Infection Control				
	Instruments shall be:				
	Fully autoclavable (≥ 134°C)				
	Compatible with low-temperature sterilization (if required)				
	Resistant to chemical disinfectants				
	Easy to clean (no hidden cavities)				
	5. Standards & Compliance				

	The set shall comply with:				
	ISO 13485 (Quality Management System)				
	ISO 7153-1 (Surgical Instruments Materials)				
	CE Marking and/or FDA Approval				
	6. Safety Requirements				
	Free from toxic or hazardous materials				
	Smooth edges to prevent accidental injury				
	Designed to minimize tissue damage				
	7. Packaging & Labeling				
	Supplied in:				
	Sterilization tray or medical-grade case				
	Each instrument shall be:				
	Clearly identified (engraved or labeled)				
	Preserved in a way that prevents damage during transport				
	8. Maintenance & After-Sales Service				
	Minimum warranty: **12–24 months**				
	Availability of spare parts				
	(Re-sharpening)				
	Technical support availability				
	9. Documentation Requirements				
	Supplier shall provide:				
	User Manual				
	Technical Datasheet / Catalog				
	Certificate of Origin				
	Quality Certificates (ISO / CE / FDA)				
	Packing List				
	10. Training (If Required)				
	Basic user training upon request				
	Instructions for cleaning, handling, and sterilization				
5	**Pediatric Surgery Set (Children Surgical Instruments Set)**				
	1. General Description				
	The **Pediatric Surgery Set** is designed for surgical procedures in infants and children, including:				
	General pediatric surgery				
	Neonatal surgery				
	Soft tissue and minor surgical procedures				
	The set shall consist of **fine, precise, and size-appropriate instruments** to ensure safe handling of delicate pediatric tissues.				
	2. Scope of Supply				
	The set shall include, but not be limited to, the following instruments:				
	Cutting Instruments				
	Fine Surgical Scissors (Straight & Curved)				
	Iris Scissors				
	Delicate Dissecting Scissors				
	Grasping Instruments				
	Tissue Forceps (fine, atraumatic, with/without teeth)				
	Adson Forceps (pediatric size)				
	Dressing Forceps				
	Clamping Instruments				
	Mosquito Hemostatic Forceps (small size)				
	Pediatric Artery Forceps				
	Needle Handling				
	Fine Needle Holders (pediatric size)				

	Retractors				
	Small Retractors (e.g., Senn type or equivalent)				
	Skin Hooks				
	Additional Instruments				
	Small Scalpel Handles				
	Probes and Dilators (if required)				
	Suction Tips (pediatric size)				
	📌 *Suppliers may include additional items necessary for a complete pediatric surgical set.*				
	3. Technical Specifications				
	3.1 Materials				
	Instruments shall be made of:				
	High-quality medical-grade stainless steel				
	Resistant to:				
	Corrosion				
	Rust				
	Satin/matte finish to reduce glare				
	3.2 Design & Size				
	Specifically designed for pediatric use:				
	Smaller sizes				
	Fine tips				
	Lightweight and easy to handle				
	Ergonomic and balanced design				
	Atraumatic edges to minimize tissue injury				
	3.3 Performance Requirements				
	High precision in delicate surgical procedures				
	Smooth and accurate movement of joints				
	Secure locking mechanisms (where applicable)				
	Minimal tissue trauma				
	3.4 Durability				
	Suitable for repeated use				
	Maintain alignment and sharpness over time				
	Resistant to wear and deformation				
	4. Sterilization & Infection Control				
	Fully autoclavable (≥ 134°C)				
	Compatible with:				
	Low-temperature sterilization				
	Chemical sterilization methods				
	Easy to clean and disinfect				
	5. Standards & Compliance				
	The set shall comply with:				
	ISO 13485 (Quality Management System)				
	ISO 7153-1 (Surgical Instruments Materials)				
	CE Marking and/or FDA Approval				
	6. Safety Requirements				
	Non-toxic materials				
	Smooth edges and atraumatic tips				
	Designed to reduce risk in neonatal and pediatric use				
	High safety when handling sensitive tissues				
	7. Packaging & Labeling				
	Supplied in:				
	Sterilization tray or medical-grade case				
	Each instrument shall be:				
	Clearly identified (engraved or labeled)				
	Proper protection during shipping				
	8. Maintenance & After-Sales Service				
	Warranty: **minimum 12–24 months**				
	Availability of spare parts				

	Tool resharpening capability				
	Technical support availability				
	9. Documentation Requirements				
	Supplier shall provide:				
	User Manual				
	Technical Datasheet / Catalog				
	Certificate of Origin				
	Quality Certificates (ISO / CE / FDA)				
	Packing List				
	10. Training (If Required)				
	Basic user training				
	Instructions for cleaning and sterilization				
6	**Vascular Surgery Set (Vascular & Microvascular Instruments Set)**				
	1. General Description				
	The **Vascular Surgery Set** is intended for:				
	Open vascular procedures				
	Peripheral and central vessel surgery				
	Microvascular and delicate anastomosis procedures				
	The set shall consist of **high-precision, atraumatic instruments** designed to handle delicate blood vessels with minimal tissue damage.				
	2. Scope of Supply				
	The set shall include, but not be limited to, the following instruments:				
	Cutting Instruments				
	Fine Surgical Scissors (Straight & Curved)				
	Potts-Smith Scissors (angled, delicate) or equivalent				
	Micro Scissors				
	Grasping Instruments				
	Atraumatic Vascular Forceps				
	DeBakey Forceps or equivalent				
	Micro Forceps				
	Clamping Instruments				
	Vascular Clamps (various sizes, atraumatic)				
	Bulldog Clamps				
	Partial Occlusion Clamps				
	Needle Handling				
	Fine Needle Holders				
	Micro Needle Holders				
	Retractors				
	Small and fine retractors				
	Vessel loops and hooks				
	Dilators & Probes				
	Vessel Dilators				
	Vascular Probes				
	📌 *Suppliers may include additional instruments necessary for a complete vascular surgical set.*				
	3. Technical Specifications				
	3.1 Materials				
	All instruments shall be made of:				
	High-quality medical-grade stainless steel				
	Resistant to:				
	Corrosion				
	Rust				
	Non-magnetic (preferred for precision work)				
	Satin or matte finish to reduce glare				

	3.2 Design & Precision				
	Atraumatic tips designed for vascular handling				
	Fine and delicate construction for microvascular work				
	Smooth jaw alignment with no gaps				
	Ergonomic handles for precise control				
	3.3 Performance Requirements				
	High precision in vessel manipulation and suturing				
	Minimal trauma to vessel walls				
	Smooth locking mechanisms for clamps				
	Consistent clamping force without slippage				
	3.4 Durability				
	Maintain precision after repeated use				
	No misalignment or loosening over time				
	Resistant to wear and deformation				
	4. Sterilization & Infection Control				
	Fully autoclavable (≥ 134°C)				
	Compatible with:				
	Low-temperature sterilization				
	Chemical sterilization methods				
	Easy to clean and disinfect				
	5. Standards & Compliance				
	The set shall comply with:				
	ISO 13485 (Quality Management System)				
	ISO 7153-1 (Surgical Instrument Materials)				
	CE Marking and/or FDA Approval				
	6. Safety Requirements				
	Atraumatic design to protect blood vessels				
	Free from toxic or hazardous materials				
	Smooth edges and precision tips				
	Safe for prolonged and delicate procedures				
	7. Packaging & Labeling				
	Supplied in:				
	Sterilization tray or medical-grade instrument case				
	Each instrument shall be:				
	Clearly identified (engraved or labeled)				
	Protected during transportation				
	8. Maintenance & After-Sales Service				
	Warranty: **minimum 24 months**				
	Availability of spare parts				
	The possibility of resharpening precision tools				
	Technical support availability				
	9. Documentation Requirements				
	Supplier shall provide:				
	User Manual				
	Technical Datasheet / Catalog				
	Certificate of Origin				
	Quality Certificates (ISO / CE / FDA)				
	Packing List				
	10. Training (If Required)				
	Basic user training				
	Instructions for cleaning, handling, and sterilization				
7	**Autoclave Sterilizer – 250 Liters (Steam Sterilizer)**				
	1. General Description				
	The Autoclave Sterilizer (250 Liters capacity) shall be a **fully automatic, high-performance steam sterilization system** designed for use in:				
	Hospitals				

	Operating Theatres				
	Central Sterile Supply Departments (CSSD)				
	The unit shall be suitable for sterilizing:				
	Surgical instruments				
	Textiles				
	Medical devices				
	Laboratory materials				
	2. Capacity and Chamber				
	Chamber capacity: **Approximately 250 Liters**				
	Chamber configuration: Horizontal				
	Chamber material:				
	Stainless Steel AISI 316L or equivalent				
	Outer jacket:				
	Stainless Steel AISI 304 or equivalent				
	Chamber construction:				
	Designed to withstand high pressure and temperature				
	Internal surface:				
	Smooth, polished, corrosion-resistant finish				
	3. Technical Performance				
	3.1 Sterilization Parameters				
	Temperature range:				
	121°C to 134°C				
	Pressure:				
	In accordance with steam sterilization standards				
	Available sterilization cycles:				
	Wrapped instruments				
	Unwrapped instruments				
	Textiles				
	Liquids (if applicable)				
	3.2 Control System				
	Fully automatic microprocessor-controlled system				
	Touchscreen display (preferred)				
	User-friendly interface				
	Multi-language support (English mandatory)				
	Pre-programmed cycles and customizable programs				
	3.3 Monitoring and Recording				
	Real-time display of:				
	Temperature				
	Pressure				
	Time				
	Integrated data recording system				
	Built-in printer or USB/export capability				
	Storage of sterilization cycle records				
	4. Safety Features				
	Overpressure protection system				
	Over-temperature protection				
	Safety relief valve				
	Door safety interlock system (prevents opening under pressure)				
	Emergency stop button				
	Audible and visual alarm system				
	5. Door System				
	Door type:				
	Hinged or sliding				
	Sealing system:				
	High-quality silicone gasket or equivalent				
	Locking system:				
	Automatic or semi-automatic				

	6. Steam Generation				
	Built-in steam generator or external steam supply				
	Automatic water filling system				
	Compatible with:				
	Water filter				
	Distilled or treated water				
	7. Utilities Requirements				
	Power supply:				
	220–240V / 50Hz or 3-phase (as required)				
	Water supply and drainage connection required				
	Energy-efficient operation preferred				
	8. Construction and Installation				
	Compact and robust design				
	Suitable for hospital environments				
	Easy installation and maintenance				
	Mounted on a stable base or frame				
	9. Standards and Compliance				
	The equipment shall comply with:				
	ISO 13485 (Quality Management System)				
	ISO 17665 (Moist Heat Sterilization)				
	IEC 61010 / IEC 60601 (Electrical Safety)				
	CE Marking and/or FDA Approval				
	10. Accessories				
	The system shall include:				
	Stainless steel loading baskets or trays				
	Loading trolley (if applicable)				
	Basic consumables				
	Spare door gasket				
	Optional (preferred):				
	Water treatment unit				
	11. Maintenance and After-Sales Service				
	Warranty:				
	Minimum **24 months**				
	Preventive maintenance program				
	Availability of spare parts for **10 years**				
	Technical support response time:				
	Within 24–48 hours				
	12. Documentation Requirements				
	The supplier shall provide:				
	User Manual				
	Service Manual				
	Installation and operation requirements				
	Calibration certificate				
	CE/FDA certificates				
	Technical datasheet/catalog				
	13. Training				
	On-site training for:				
	End users (CSSD staff)				
	Biomedical engineers				
	Training shall include:				
	Operation				
	Cleaning				
	Basic maintenance				
8	**Battery-Operated Cannulated Orthopedic Surgical Drill**				
	1. General Description				

	The **Battery-Operated Cannulated Orthopedic Drill** shall be a **portable, high-performance cannulated surgical drill** intended for:				
	Orthopedic surgeries requiring **guidewire-assisted drilling**				
	(e.g., cannulated screw fixation, hip, knee, and trauma procedures)				
	Small and large bone drilling procedures using **cannulated drill bits**				
	Use in operating theatres and emergency settings				
	The device shall be **ergonomic, lightweight**, and compatible with **standard cannulated orthopedic systems and accessories**.				
	2. Technical Specifications				
	2.1 Drill Performance				
	Speed range: 0–3,500 RPM (variable)				
	Torque: Adjustable, suitable for cortical and cancellous bone				
	Forward and reverse rotation				
	High efficiency with minimal vibration				
	Precision control for delicate procedures				
	Cannulated design allowing use over guidewires (e.g., 2.0–4.0 mm K-wires)				
	High concentricity and minimal runout for accurate over-wire drilling				
	2.2 Battery System				
	Rechargeable lithium-ion battery pack				
	Battery life: ≥ 120 minutes of continuous use				
	Charging time: ≤ 60 minutes per battery				
	Indicator for battery status (LED display preferred)				
	Interchangeable battery system				
	2.3 Drill Handpiece				
	Lightweight, ergonomic design				
	Cannulated (hollow shaft) design compatible with guidewires				
	Sterilizable parts (autoclavable where applicable)				
	Compatible with **standard cannulated drill bits, reamers, and screw systems**				
	Quick coupling system for drill attachments				
	Sealed design to prevent fluid ingress into cannulation				
	3. Accessories (Minimum)				
	Charger (single or dual battery)				
	Cannulated drill bit set (various diameters and lengths)				
	Guidewires (K-wires) – multiple sizes				
	Drill handle extension/adapter (if applicable)				
	Carrying/sterilization case				
	Battery pack(s)				
	Cannulation cleaning brushes/rods				
	4. Safety Features				
	Overload protection				
	Automatic shut-off when battery is low				
	Anti-slip ergonomic grip				
	Forward/Reverse safety switch				
	Resistant to overheating during prolonged use				
	Secure locking mechanism for cannulated attachments				

	5. Sterilization & Infection Control				
	Autoclavable handpiece covers and drill bits				
	Cannulated components must be fully cleanable internally				
	Smooth surfaces for easy cleaning and disinfection				
	Resistant to hospital-grade disinfectants				
	6. Standards & Compliance				
	The device shall comply with:				
	ISO 13485 (Medical Device Quality Management System)				
	IEC 60601-1 (Electrical and Safety Requirements)				
	CE Marking and/or FDA Approval				
	ASTM F899 / ISO 7740 (Orthopedic Surgical Drills and Accessories)				
	7. Documentation				
	Supplier shall provide:				
	User Manual				
	Service & Maintenance Manual				
	Technical Datasheet / Catalog				
	Certificate of Conformity / CE / FDA				
	Warranty certificate (minimum 24 months)				
	8. Training				
	On-site training for surgeons and biomedical engineers				
	Operation, guidewire handling, cleaning of cannulation, and maintenance				
9	**Orthopedic Surgical Saw (Electric / Battery Operated)**				
	1. General Description				
	The **Orthopedic Surgical Saw** shall be a **high-performance, precise cutting instrument** designed for use in:				
	Orthopedic surgeries (bone cutting, fracture fixation, joint replacement)				
	Trauma and reconstructive procedures				
	Hospital operating theatres and emergency orthopedic settings				
	The device shall be **ergonomic, safe, and compatible with standard saw blades and accessories**.				
	2. Technical Specifications				
	2.1 Saw Performance				
	Type: Electric / Cordless battery-operated				
	Speed range: 0–3,500 RPM (adjustable)				
	Stroke length: 15–20 mm (or equivalent)				
	Forward and reverse motion				
	Smooth operation with minimal vibration				
	Precise and controlled cutting for cortical and cancellous bone				
	2.2 Battery / Power System (If Battery Operated)				
	Rechargeable lithium-ion battery				
	Continuous operation: ≥ 120 minutes per charge				
	Charging time: ≤ 60 minutes				
	Battery indicator (LED display preferred)				
	Interchangeable battery pack system				
	2.3 Handpiece				
	Ergonomic and lightweight design for prolonged use				
	Sterilizable or autoclavable handpiece covers				
	Quick coupling system for blades				
	Smooth, anti-slip grip				

	3. Blades & Accessories (Minimum)				
	Set of sterile orthopedic saw blades (various types/sizes)				
	Blade storage and sterilization case				
	Charger and spare battery (if battery-operated)				
	Carrying / sterilization case				
	Blade adapters / connectors				
	4. Safety Features				
	Overload protection				
	Automatic shut-off on low battery (for cordless saws)				
	Anti-slip ergonomic handpiece				
	Blade locking mechanism to prevent accidental detachment				
	Minimal vibration to reduce user fatigue				
	5. Sterilization & Infection Control				
	Autoclavable handpiece covers and blades				
	Smooth surfaces for easy cleaning and disinfecting				
	Resistant to hospital-grade disinfectants				
	6. Standards & Compliance				
	The device shall comply with:				
	ISO 13485 (Medical Device Quality Management System)				
	IEC 60601-1 (Electrical Safety, if electric)				
	ASTM F899 / ISO 7740 (Orthopedic Surgical Saws and Accessories)				
	CE Marking and/or FDA Approval				
	7. Documentation				
	Supplier shall provide:				
	User Manual				
	Service & Maintenance Manual				
	Technical Datasheet / Catalog				
	Certificate of Conformity / CE / FDA				
	Warranty certificate (minimum 24 months)				
	8. Training				
	On-site training for surgeons and biomedical engineers				
	Operation, battery handling, cleaning, and maintenance				
10	**Tonsillectomy Surgical Set**				
	1. General Description				
	The **Tonsillectomy Set** shall be a **complete set of surgical instruments** designed for:				
	Tonsil and adenoid removal				
	Otorhinolaryngology (ENT) surgical procedures				
	Both adult and pediatric patients				
	The instruments shall be **precise, atraumatic, and durable**, suitable for repeated sterilization and hospital use.				
	2. Scope of Supply				
	The set shall include, but not be limited to, the following instruments:				
	Cutting and Dissecting Instruments				
	Tonsil Scissors (straight and curved)				
	Metzenbaum Scissors				
	Adson or small dissecting scissors				
	Grasping Instruments				
	Tonsil or tissue forceps (with/without teeth)				
	Adson Forceps				

	Clamping and Hemostatic Instruments				
	Mosquito forceps				
	Small artery forceps				
	Tonsil clamps				
	Retractors and Holders				
	Tonsil retractors (e.g., Davis or modified Killian type)				
	Tongue depressors or tongue blades				
	Mouth gags (e.g., Boyle-Davis type)				
	Additional Instruments				
	Needle holders (fine/pediatric size)				
	Suction tips (if applicable)				
	Tongue tie or soft tissue elevator				
	📌 *Suppliers may include additional instruments necessary for a complete functional set.*				
	3. Technical Specifications				
	3.1 Materials				
	High-quality, **medical-grade stainless steel**				
	Resistant to corrosion and rust				
	Matte or satin finish to reduce glare				
	3.2 Design & Precision				
	Fine tips for atraumatic tissue handling				
	Ergonomic, anti-slip handles				
	Smooth joint alignment for scissors and clamps				
	Suitable for delicate ENT tissue manipulation				
	3.3 Performance Requirements				
	Precise cutting and tissue handling				
	Smooth opening/closing of scissors and clamps				
	Long-lasting sharpness and durability				
	3.4 Durability				
	Suitable for repeated sterilization				
	No misalignment or loosening of joints				
	Resistant to wear and deformation				
	4. Sterilization & Infection Control				
	Fully autoclavable (≥134°C)				
	Compatible with chemical disinfectants				
	Easy to clean with no hidden cavities				
	5. Standards & Compliance				
	The set shall comply with:				
	ISO 13485 (Quality Management System)				
	ISO 7153-1 (Surgical Instruments Materials)				
	CE Marking and/or FDA Approval				
	6. Safety Requirements				
	Smooth edges to prevent accidental injury				
	Non-toxic and biocompatible materials				
	Atraumatic design to protect delicate oral tissues				
	7. Packaging & Labeling				
	Supplied in sterilization tray or medical-grade case				
	Instruments clearly labeled or engraved				
	Protected to prevent damage during transport				
	8. Maintenance & After-Sales Service				
	Warranty: minimum **12–24 months**				
	Availability of spare parts and re-sharpening				
	Technical support for maintenance				
	9. Documentation Requirements				
	Supplier shall provide:				
	User Manual				
	Technical Datasheet / Catalog				
	Certificate of Origin				

	Quality Certificates (ISO / CE / FDA)				
	Packing List				
	10. Training				
	On-site training for surgical staff (optional)				
	Instructions for handling, cleaning, and sterilization				
11	**Esophagoscope Surgical Set**				
	1. General Description				
	The **Esophagoscope Set** shall be a **complete rigid endoscopic instrument set** designed for:				
	Examination and surgical procedures of the esophagus				
	ENT and gastroenterology applications				
	Adult and pediatric patients				
	The instruments shall be **precise, durable, and compatible with standard illumination and suction systems**.				
	2. Scope of Supply				
	The set shall include, but not be limited to:				
	Esophagoscopes				
	Rigid esophagoscope of varying sizes (adult and pediatric)				
	Blades and straight/curved tubes				
	Removable obturators				
	Ancillary Instruments				
	Biopsy forceps				
	Foreign body grasping forceps				
	Esophageal dilators				
	Suction adapters and tips				
	Illumination and Visualization				
	Light source connector compatible with standard operating room light source				
	Fiber optic illumination cable (autoclavable)				
	Additional Accessories				
	Handle and sheath for rigid scope				
	Storage tray with individual instrument slots				
	Cleaning brushes and protective covers				
	📌 *Suppliers may include additional instruments necessary for a complete functional set.*				
	3. Technical Specifications				
	3.1 Materials				
	High-quality, **medical-grade stainless steel**				
	Corrosion and rust-resistant				
	Smooth, polished surface for patient safety				
	Fiber optic cables made of durable, sterilizable material				
	3.2 Design & Precision				
	Blades and tubes designed for atraumatic esophageal access				
	Ergonomic handles				
	Smooth joints and detachable components for easy cleaning				
	Compatible with suction and illumination systems				
	3.3 Performance Requirements				
	Clear visualization of the esophageal lumen				
	Precise biopsy and foreign body retrieval				
	Long-lasting structural integrity and illumination				
	3.4 Durability				
	Autoclavable and compatible with repeated sterilization				

	Resistant to mechanical wear and deformation				
	4. Sterilization & Infection Control				
	Fully autoclavable instruments and sheaths (≥134°C)				
	Compatible with hospital-grade chemical disinfectants				
	Smooth surfaces for efficient cleaning				
	5. Standards & Compliance				
	The set shall comply with:				
	ISO 13485 (Quality Management System)				
	ISO 7153-1 (Surgical Instruments Materials)				
	CE Marking and/or FDA Approval				
	6. Safety Requirements				
	Smooth edges and atraumatic design				
	Non-toxic, biocompatible materials				
	Compatible with standard OR suction and illumination				
	7. Packaging & Labeling				
	Supplied in sterilization tray or medical-grade storage case				
	Each instrument labeled or engraved for identification				
	Protective arrangement to prevent damage during transport				
	8. Maintenance & After-Sales Service				
	Warranty: minimum **12–24 months**				
	Availability of spare parts				
	Technical support for instrument maintenance				
	9. Documentation Requirements				
	Supplier shall provide:				
	User Manual				
	Technical Datasheet / Catalog				
	Certificate of Origin				
	Quality Certificates (ISO / CE / FDA)				
	Packing List				
	10. Training				
	On-site training for surgeons and biomedical staff				
	Instructions for handling, cleaning, and sterilization				
12	**Bronchoscope Surgical Set**				
	1. General Description				
	The **Bronchoscope Set** shall be a **complete rigid and/or flexible bronchoscopy instrument set** designed for:				
	Examination and therapeutic procedures of the trachea and bronchi				
	Pulmonology, anesthesia, and ENT applications				
	Adult and pediatric patients				
	The instruments shall be **precise, durable, sterilizable, and compatible with standard OR light sources and suction systems**.				
	2. Scope of Supply				
	The set shall include, but not be limited to:				
	Bronchoscopes				
	Rigid bronchoscope of varying sizes (adult and pediatric)				
	Flexible bronchoscope (optional)				
	Removable obturators and sheaths				
	Ancillary Instruments				
	Biopsy forceps				
	Foreign body grasping forceps				
	Cytology brushes				

	Suction adapters and tips				
	Illumination and Visualization				
	Light source connector compatible with standard OR or endoscopy light sources				
	Fiber optic illumination cables (autoclavable)				
	Camera adapter (optional for flexible bronchoscope)				
	Additional Accessories				
	Handle and sheath for rigid scope				
	Storage tray with individual instrument slots				
	Cleaning brushes and protective covers				
	📌 *Suppliers may include additional instruments necessary for a complete functional set.*				
	3. Technical Specifications				
	3.1 Materials				
	High-quality, **medical-grade stainless steel** for rigid scopes				
	Corrosion-resistant, autoclavable components				
	Smooth, polished surfaces for patient safety				
	Fiber optic cables made of durable, sterilizable material				
	3.2 Design & Precision				
	Atraumatic tips for safe insertion				
	Ergonomic handles for surgeon comfort				
	Smooth joints and detachable components for easy cleaning				
	Compatible with suction, illumination, and optional camera systems				
	3.3 Performance Requirements				
	Clear visualization of trachea and bronchi				
	Accurate biopsy and foreign body retrieval				
	Long-lasting structural integrity and fiber optic illumination				
	3.4 Durability				
	Autoclavable and compatible with repeated sterilization				
	Resistant to mechanical wear and deformation				
	4. Sterilization & Infection Control				
	Fully autoclavable instruments and sheaths (≥134°C)				
	Compatible with hospital-grade chemical disinfectants				
	Smooth surfaces for easy cleaning				
	5. Standards & Compliance				
	The set shall comply with:				
	ISO 13485 (Quality Management System)				
	ISO 7153-1 (Surgical Instruments Materials)				
	CE Marking and/or FDA Approval				
	6. Safety Requirements				
	Atraumatic tips and smooth edges				
	Non-toxic, biocompatible materials				
	Compatible with standard OR suction and illumination systems				
	7. Packaging & Labeling				
	Supplied in sterilization tray or medical-grade storage case				
	Each instrument clearly labeled or engraved				
	Protective arrangement to prevent damage during transport				
	8. Maintenance & After-Sales Service				
	Warranty: minimum **12–24 months**				
	Availability of spare parts				

	Technical support for instrument maintenance				
	9. Documentation Requirements				
	Supplier shall provide:				
	User Manual				
	Technical Datasheet / Catalog				
	Certificate of Origin				
	Quality Certificates (ISO / CE / FDA)				
	Packing List				
	10. Training				
	On-site training for surgeons and biomedical staff				
	Instructions for handling, cleaning, and sterilization				
13	**ENT Tower (Complete Endoscopy System for ENT Surgery)**				
	1. General Description				
	The **ENT Tower** shall be a **modular, integrated endoscopy system** designed for:				
	Otorhinolaryngology (ENT) surgeries				
	Diagnostic and operative endoscopic procedures				
	Adult and pediatric patients				
	The system shall provide **high-definition imaging, illumination, and integrated recording/documentation capabilities**, ensuring precision, safety, and efficiency in ENT surgeries.				
	2. Scope of Supply				
	The ENT Tower shall include, but not be limited to:				
	2.1 Imaging & Camera System				
	HD or Full HD camera head (compatible with rigid and flexible endoscopes)				
	Image processor and control unit				
	Light source integration (LED or Xenon)				
	Video output: HDMI/DVI/VGA for external monitors				
	2.2 Illumination System				
	Fiber optic light cables				
	Adjustable intensity control				
	Cold light source (LED or Xenon)				
	Compatible with rigid and flexible ENT scopes				
	2.3 Display & Documentation				
	Medical-grade monitor(s) ≥ 24 inch				
	Recording capability (video and still images)				
	Optional integration with PACS or hospital network				
	Touchscreen control panel (preferred)				
	2.4 Suction & Irrigation				
	Integrated suction unit				
	Adjustable flow control				
	Sterile irrigation system connection				
	Footswitch control (optional)				
	2.5 Additional Features				
	Mobile tower with lockable castors				
	Multiple drawers and storage for instruments and endoscopes				
	Cable management system				
	Emergency backup power (optional UPS integration)				
	3. Technical Specifications				
	3.1 Camera & Video				
	Resolution: HD 1080p or higher				
	Digital zoom and focus control				

	Compatible with standard rigid ENT scopes (0°, 30°, 70°)				
	Compatible with flexible endoscopes (if applicable)				
	3.2 Light Source				
	Intensity: Adjustable 10–100%				
	LED/Xenon with long lifespan (≥5,000 hours for Xenon, ≥50,000 hours for LED)				
	Quick-connect fiber optic cables				
	3.3 Tower Construction				
	Stainless steel or coated aluminum mobile frame				
	Lockable castors for stability				
	Shelves for video processor, suction, and storage				
	4. Sterilization & Infection Control				
	All patient-contact accessories sterilizable/autoclavable				
	Smooth, cleanable surfaces				
	Cable and instrument ports designed for infection control				
	5. Safety & Reliability				
	CE/FDA certified components				
	Overheat protection for light source				
	Electrical safety per IEC 60601-1				
	Emergency stop function				
	Stable tower with anti-tip design				
	6. Standards & Compliance				
	The system shall comply with:				
	ISO 13485 (Quality Management System)				
	IEC 60601 series (Electrical Safety)				
	CE Marking and/or FDA Approval				
	EN 60601-2-18 for endoscopic equipment				
	7. Documentation				
	Supplier shall provide:				
	User Manual and Service Manual				
	Technical Datasheet / Catalog				
	Certificate of Conformity / CE / FDA				
	Packing List				
	Warranty certificate (minimum 24 months)				
	8. Training				
	On-site training for surgeons, nurses, and biomedical engineers				
	Operation, cleaning, sterilization, and maintenance				
14	**Mastoidectomy Surgical Set**				
	1. General Description				
	The **Mastoidectomy Set** shall be a **complete ENT surgical instrument set** specifically designed for:				
	Mastoidectomy and related ear surgeries				
	Otorhinolaryngology (ENT) procedures				
	Adult and pediatric patients				
	The instruments shall be **precise, durable, autoclavable, and suitable for delicate bone and soft tissue manipulation**.				
	2. Scope of Supply				
	The set shall include, but not be limited to:				
	Cutting and Dissecting Instruments				
	Mastoidectomy chisels (various sizes)				
	Curettes (various sizes, sharp/blunt)				
	Bone gouges				
	Elevators (various types)				

	Grasping and Holding Instruments				
	Alligator forceps (various sizes)				
	Tissue forceps (with and without teeth)				
	Needle holders				
	Clamps and Hemostatic Instruments				
	Small artery forceps				
	Mosquito forceps				
	Retractors (various sizes, including self-retaining if applicable)				
	Specialized Instruments				
	Ear speculum (various sizes)				
	Suction tips (straight and angled)				
	Mallets for bone chisels (if applicable)				
	Micro curettes and picks				
	Additional Accessories				
	Sterilization tray with individual instrument slots				
	Handle adapters for powered instruments (if compatible)				
	📌 *Suppliers may include additional instruments necessary for a complete functional mastoidectomy set.*				
	3. Technical Specifications				
	3.1 Materials				
	High-quality, **medical-grade stainless steel**				
	Corrosion-resistant and autoclavable				
	Polished matte or satin finish to reduce glare				
	3.2 Design & Precision				
	Fine tips for atraumatic tissue and bone handling				
	Ergonomic, anti-slip handles				
	Smooth joint alignment for scissors, forceps, and clamps				
	Instruments suitable for microscopic or endoscopic ENT surgery				
	3.3 Performance Requirements				
	Precise bone and soft tissue manipulation				
	Long-lasting sharpness and structural integrity				
	Compatible with powered or manual instrumentation				
	3.4 Durability				
	Suitable for repeated sterilization (autoclave ≥134°C)				
	Resistant to mechanical wear and deformation				
	4. Sterilization & Infection Control				
	Fully autoclavable instruments				
	Compatible with hospital-grade chemical disinfectants				
	Smooth surfaces for efficient cleaning				
	5. Standards & Compliance				
	The set shall comply with:				
	ISO 13485 (Medical Device Quality Management System)				
	ISO 7153-1 (Surgical Instruments Materials)				
	CE Marking and/or FDA Approval				
	6. Safety Requirements				
	Atraumatic tips and smooth edges				
	Non-toxic, biocompatible materials				
	Handles designed to prevent slippage				
	7. Packaging & Labeling				
	Supplied in sterilization tray or medical-grade storage case				
	Individual instruments labeled or engraved				

	Protective arrangement to prevent damage during transport				
	8. Maintenance & After-Sales Service				
	Warranty: minimum **12–24 months**				
	Availability of spare parts				
	Technical support for instrument maintenance				
	9. Documentation Requirements				
	Supplier shall provide:				
	User Manual				
	Technical Datasheet / Catalog				
	Certificate of Origin				
	Quality Certificates (ISO / CE / FDA)				
	Packing List				
	10. Training				
	On-site training for surgeons and biomedical staff				
	Instructions for handling, cleaning, and sterilization				
15	**Laser Lithotripsy / Fragmentation System (120 W)**				
	1. General Description				
	The Laser Lithotripsy System shall be a **high-power (≥120 Watts), advanced laser platform** designed for urological applications, including:				
	Lithotripsy of kidney, ureter, and bladder stones				
	Endoscopic and minimally invasive procedures				
	Use in adult and pediatric patients				
	The system shall provide **high-efficiency stone fragmentation and dusting**, with **advanced pulse modulation, reusable fiber compatibility**, and comprehensive safety features to ensure optimal clinical outcomes and operator safety.				
	2. Technical Specifications				
	2.1 Laser System				
	Laser Type: Holmium:YAG or equivalent advanced laser technology				
	Wavelength: Approximately 2,100 nm				
	Maximum Power Output: ≥ 120 Watts				
	Energy Range: 0.2 – 6.0 Joules per pulse				
	Pulse Frequency: Up to ≥ 80–120 Hz (higher preferred)				
	Pulse Width: Adjustable (short, long, and advanced pulse modes)				
	Pulse Modulation Technology: For improved stone dusting and reduced retropulsion				
	Peak Power: Adjustable with stable output performance				
	Cooling System: High-efficiency cooling system enabling continuous operation				
	2.2 Fiber Compatibility				
	The system shall be compatible with standard laser fibers				
	Reusable laser fibers only (mandatory requirement)				
	Fiber sizes required: 230 µm, 365 µm, and 600 µm				
	Quantity: Minimum 3 fibers for each size (total 9 fibers)				
	Fibers shall be **autoclavable and designed for repeated sterilization cycles**				
	Minimum durability: ≥ 20–50 sterilization cycles (manufacturer to specify and guarantee)				

	Fiber tips shall be re-cleavable/strippable to restore performance after repeated use				
	Quick-connect fiber interface				
	Adjustable fiber delivery system				
	2.3 Operating Modes				
	Stone fragmentation mode (higher energy, moderate frequency)				
	Stone dusting mode (lower energy, higher frequency)				
	Fine dusting mode (very low energy, very high frequency)				
	Advanced pulse shaping/modulation modes for optimized stone management				
	3. User Interface & Control				
	High-resolution touchscreen display				
	Intuitive and user-friendly interface				
	Adjustable parameters:				
	Energy (Joules)				
	Frequency (Hz)				
	Pulse width				
	Real-time display of:				
	Output power				
	Pulse frequency				
	Total delivered energy				
	Pre-set clinical programs (optional)				
	Audible and visual alerts				
	4. Safety Features				
	Key-lock or user authentication system				
	Footswitch control for laser activation				
	Emergency stop button				
	Laser emission indicators (audible and visual)				
	Eye protection warning system				
	Advanced overheat protection with automatic shutdown				
	System self-diagnostics and fault detection				
	5. Physical & Operational Requirements				
	Mobile cart-based system with lockable castors				
	Compact and ergonomic design suitable for OR use				
	Power supply: 220–240V AC, 50/60 Hz				
	Noise level: ≤ 60 dB				
	Designed for continuous, high-volume clinical use				
	Operating temperature: 10–35°C				
	6. Sterilization & Infection Control				
	Reusable laser fibers must be fully autoclavable				
	Manufacturer shall provide **validated reprocessing instructions** including:				
	Cleaning				
	Disinfection				
	Sterilization				
	Maximum reuse cycles				
	Fibers shall maintain performance throughout the declared lifecycle				
	Smooth and cleanable external surfaces				
	Full compatibility with hospital infection control standards				
	7. Standards & Compliance				
	The system shall comply with the following standards:				
	IEC 60601-1 (Medical Electrical Equipment – General Safety)				

	IEC 60601-2-22 (Particular requirements for surgical laser equipment)				
	ISO 13485 (Medical Device Quality Management System)				
	CE Marking and/or FDA Approval				
	8. Documentation				
	The supplier shall provide:				
	User Manual				
	Technical Datasheet / Product Catalog				
	Certificate of Conformity (CE and/or FDA)				
	Validated reprocessing instructions for reusable fibers				
	Warranty certificate (minimum 24 months)				
	9. Training				
	On-site training for urologists, nurses, and biomedical engineers				
	Training shall include:				
	System operation				
	Laser safety				
	Fiber handling and maintenance				
	Cleaning and sterilization procedures				
16	**URS (Ureterorenoscope)**				
	Technical Specification				
	Ureterorenoscope System (Semi-Rigid & Flexible – Adult / Pediatric)				
	1. General Description				
	The Ureterorenoscope (URS) System shall be a **comprehensive endourology system** including **semi-rigid and flexible ureteroscopes**, designed for:				
	Diagnostic and therapeutic procedures of the ureter and kidney				
	Endourological interventions including **stone removal, laser lithotripsy, and biopsies**				
	Management of **adult and pediatric patients**				
	The system shall provide **high-definition visualization, atraumatic access, and excellent maneuverability**, with full compatibility with standard endourological accessories.				
	2. Scope of Supply				
	The system shall include:				
	2.1 Semi-Rigid Ureteroscope (Adult)				
	Outer diameter: **7.5 Fr (Adult size)**				
	Working length: 430–500 mm (or equivalent)				
	High optical resolution system (rod lens or equivalent)				
	Straight/rigid shaft for ureteral access				
	Atraumatic distal tip design				
	Compatible with laser fibers and endourological accessories				
	2.2 Flexible Ureteroscope (Adult)				
	Outer diameter: ≤ 7.5 Fr				
	Working channel: ≥ 3.6 Fr				
	Deflection: **Up/Down ≥ 270°**				
	High-definition digital or fiber optic imaging system				
	High flexibility and torque resistance				
	Atraumatic distal tip				
	2.3 Pediatric Ureteroscope (Flexible Preferred)				
	Outer diameter / tip size: **4.5 Fr (Pediatric size)**				
	Ultra-slim flexible design suitable for pediatric anatomy				

	Working channel: ≥ 3.0 Fr				
	Deflection: ≥ 270° (if flexible type)				
	Ultra-atraumatic distal tip for pediatric safety				
	Optimized for low-pressure irrigation				
	2.4 Accessories				
	Sheaths and obturators (adult and pediatric sizes)				
	Biopsy forceps and stone retrieval baskets (standard & mini sizes)				
	Laser fiber compatibility:				
	Adult: 200 – 365 µm				
	Pediatric: 200 – 272 µm				
	Guidewires and dilators (adult & pediatric)				
	Irrigation connectors and flow control systems				
	Suction adapters				
	Adapters for camera and light source				
	2.5 Imaging & Visualization				
	Compatible with endoscopy camera system				
	High-definition imaging (HD / Full HD optional)				
	Fiber optic or digital integrated illumination				
	High clarity with minimal distortion				
	Excellent visualization of ureteral and renal anatomy				
	3. Technical Specifications				
	3.1 Materials				
	Medical-grade stainless steel and biocompatible polymers				
	Corrosion-resistant and durable under repeated sterilization				
	Smooth atraumatic distal tip				
	3.2 Design & Precision				
	Ergonomic handle for precise control				
	Smooth articulation for flexible scope				
	High maneuverability in complex anatomy				
	Compatibility with standard endourological instruments				
	3.3 Performance Requirements				
	Clear visualization of ureter and renal collecting system				
	Precise manipulation through working channel				
	Smooth insertion and withdrawal with minimal tissue trauma				
	Stable performance under continuous irrigation				
	3.4 Durability				
	Autoclavable (≥134°C) or compatible with low-temperature sterilization				
	Designed for repeated clinical use				
	High resistance to mechanical wear				
	4. Sterilization & Infection Control				
	Autoclavable components where applicable				

	Compatible with hospital sterilization protocols				
	Smooth, cleanable surfaces				
	Manufacturer shall provide validated reprocessing instructions				
	5. Standards & Compliance				
	The system shall comply with:				
	ISO 13485 (Medical Device Quality Management System)				
	IEC 60601-1 (Electrical Safety for illuminated systems)				
	CE Marking and/or FDA Approval				
	6. Safety Requirements				
	Atraumatic distal tip for adult and pediatric use				
	Biocompatible, non-toxic materials				
	Ergonomic design to reduce operator fatigue				
	Controlled irrigation compatibility (especially for pediatric use)				
	7. Packaging & Labeling				
	Supplied in medical-grade sterilization trays or protective cases				
	Clear labeling for semi-rigid, flexible, adult, and pediatric scopes				
	Shock-protected transport packaging				
	8. Maintenance & After-Sales Service				
	Warranty: minimum **12–24 months**				
	Availability of spare parts for all scope types				
	Technical support for repair, calibration, and maintenance				
	9. Documentation				
	Supplier shall provide:				
	User Manual				
	Technical Datasheet / Catalog				
	Certificate of Conformity (CE / FDA)				
	Packing List				
	Warranty Certificate				
	10. Training				
	On-site training for urologists, nurses, and biomedical engineers				
	Training shall include:				
	Semi-rigid and flexible scope handling				
	Pediatric endourology techniques				
	Cleaning and sterilization procedures				
	Safe use of accessories and laser fibers				
17	**Transurethral Resection (TUR) Surgical Set**				
	1. General Description				
	The **TUR Set** shall be a **complete endourological surgical instrument set** designed for:				

	Transurethral resection of the prostate (TURP) and bladder tumors (TURBT)				
	Adult urology procedures				
	Safe, precise, and minimally invasive surgery				
	The instruments shall provide **high precision, durability, and compatibility with standard endoscopic and electrosurgical equipment**.				
	2. Scope of Supply				
	The set shall include, but not be limited to:				
	2.1 Resectoscope Components				
	Resectoscope sheath (22–26 Fr adult size)				
	Inner sheath with obturator				
	Telescope (0° or 30°)				
	Working element (monopolar or bipolar compatible)				
	Irrigation and inflow/outflow ports				
	2.2 Ancillary Instruments				
	Electrode loop (resection loop, cutting loop)				
	Ball electrode (for coagulation)				
	Irrigation tubing set				
	Resectoscope handles and adapters				
	Obturators and connectors				
	2.3 Additional Accessories				
	Light source connection				
	Camera adapter for video documentation (optional)				
	Sterilization tray with instrument slots				
	📌 *Suppliers may include additional instruments necessary for a complete functional TUR set.*				
	3. Technical Specifications				
	3.1 Materials				
	Medical-grade stainless steel for all metallic components				
	Durable, corrosion-resistant, autoclavable				
	Smooth surfaces to prevent tissue trauma				
	3.2 Design & Performance				
	Atraumatic obturator tip				
	Ergonomic handle for precise control				
	Compatible with monopolar and/or bipolar energy sources				
	Working channel for smooth electrode passage				
	Clear visualization of bladder or prostate tissue				
	3.3 Durability				
	Autoclavable (≥134°C) or compatible with low-temperature sterilization				
	Resistant to mechanical wear and repeated use				
	4. Sterilization & Infection Control				
	Fully autoclavable components				
	Smooth, cleanable surfaces				
	Compatible with hospital infection control protocols				
	5. Standards & Compliance				
	The device shall comply with:				
	ISO 13485 (Medical Device Quality Management System)				
	IEC 60601-1 (Electrical Safety for connected devices)				
	CE Marking and/or FDA Approval				
	6. Safety Requirements				
	Atraumatic obturator tip to prevent urethral injury				
	Non-toxic, biocompatible materials				

	Electrical safety compatible with monopolar/bipolar energy				
	Ergonomic design to reduce surgeon fatigue				
	7. Packaging & Labeling				
	Supplied in sterilization tray or medical-grade case				
	Individual instruments clearly labeled				
	Protective arrangement to prevent damage during transport				
	8. Maintenance & After-Sales Service				
	Warranty: minimum **12–24 months**				
	Availability of spare parts and repair services				
	Technical support for maintenance				
	9. Documentation				
	Supplier shall provide:				
	User Manual				
	Technical Datasheet / Catalog				
	Certificate of Conformity / CE / FDA				
	Packing List				
	Warranty certificate				
	10. Training				
	On-site training for urologists and biomedical staff				
	Instructions on handling, cleaning, and sterilization				
18	**PCNL (Percutaneous Nephrolithotomy) Forceps**				
	PCNL (Percutaneous Nephrolithotomy) Forceps – Standard & Mini-PCNL Compatible				
	1. General Description				
	The PCNL Forceps shall be a specialized endourological instrument set designed for percutaneous nephrolithotomy procedures for kidney stone removal, grasping, extraction, and fragmentation of renal calculi during minimally invasive renal surgery.				
	The instruments shall be suitable for use in both **standard PCNL and Mini-PCNL procedures**, and compatible with **laser lithotripsy and pneumatic lithotripsy probes**.				
	The system shall be designed for use in **adult and pediatric patients**.				
	The instruments shall be durable, highly precise, autoclavable, and suitable for repeated surgical use.				
	2. Scope of Supply				
	2.1 Forceps Types				
	The set shall include, but not be limited to:				
	Alligator stone retrieval forceps				
	Grasping forceps (different tip sizes)				
	Cup / biopsy forceps for renal tissue (optional)				
	Rigid PCNL forceps for standard access				
	Mini-PCNL forceps for small access tracts				
	2.2 Mini-PCNL Compatibility (Mandatory)				
	Designed for mini percutaneous nephrolithotomy systems				
	Compatible with small access sheaths (mini-PCNL systems)				
	Suitable for narrow working channels				
	Compatible with laser and pneumatic lithotripsy assistance				
	2.3 Accessories				
	Ergonomic handle compatible with nephroscopes				

	Adapter connectors for endoscope/sheath systems				
	Sterilization tray with individual instrument slots				
	Compatible with standard PCNL (12–30 Fr) and Mini-PCNL systems (14–20 Fr range)				
	3. Technical Specifications				
	3.1 Materials				
	High-quality medical-grade stainless steel				
	Corrosion-resistant and autoclavable				
	Smooth atraumatic tips				
	3.2 Design & Precision				
	Ergonomic handle for precise control				
	Smooth jaw opening and closing mechanism				
	Strong gripping force without slippage				
	Compatible with nephroscopes and mini nephroscopes				
	3.3 Performance Requirements				
	Strong gripping force without tissue trauma				
	Smooth maneuverability in renal pelvis and calyces				
	Reliable operation under irrigation and saline conditions				
	Compatible with laser and pneumatic lithotripsy environments				
	Suitable for both standard and mini-PCNL procedures				
	3.4 Durability				
	Autoclavable at ≥134°C				
	Resistant to repeated sterilization cycles				
	No mechanical loosening over time				
	4. Sterilization & Infection Control				
	Fully autoclavable instruments				
	Compatible with hospital disinfectants				
	Smooth surfaces for easy cleaning				
	Manufacturer shall provide validated sterilization instructions				
	5. Standards & Compliance				
	The instruments shall comply with:				
	ISO 13485 (Medical Device Quality Management System)				
	ISO 7153-1 (Surgical Instruments Materials)				
	CE Marking and/or FDA Approval				
	6. Safety Requirements				
	Atraumatic tips to avoid renal tissue injury				
	Non-toxic, biocompatible materials				
	Ergonomic design to reduce operator fatigue				
	7. Packaging & Labeling				
	Supplied in medical-grade sterilization tray				
	Instruments clearly labeled for type and size				
	Protective packaging to prevent transport damage				
	Individual slots for each instrument				
	8. Maintenance & After-Sales Service				
	Warranty: minimum 12–24 months				
	Availability of spare parts				
	Technical support for maintenance and repair services				
	9. Documentation				
	Supplier shall provide:				
	User Manual				
	Technical Datasheet / Catalog				
	Certificate of Conformity (CE / FDA)				
	Packing List				
	Warranty Certificate				

	10. Training				
	On-site training for urologists and biomedical engineers				
	Training shall include:				
	Standard PCNL technique				
	Mini-PCNL technique				
	Instrument handling and selection				
	Cleaning, sterilization, and maintenance				
	Safe use with laser and pneumatic lithotripsy systems				
19	**General Surgical Instrument Set**				
	1. General Description				
	This specification covers a comprehensive general surgical instrument set designed for use in a wide range of surgical procedures, including vascular, cardiovascular, thoracic, abdominal, and soft tissue surgeries.				
	The instrument set is intended for use in operating rooms and surgical departments to support functions such as tissue dissection, vessel control, atraumatic clamping, surgical exposure, retraction, cutting, and suturing.				
	The set shall be suitable for repeated use under standard hospital sterilization conditions and shall ensure high precision, safety, and ergonomic handling during surgical procedures.				
	2. Material of Manufacture				
	All instruments shall be manufactured from high-quality **surgical stainless steel (or equivalent medical-grade material)** with the following characteristics:				
	High corrosion resistance.				
	Autoclavable and suitable for repeated sterilization cycles.				
	Non-toxic and biocompatible material.				
	High mechanical strength and durability				
	Smooth atraumatic finish to minimize tissue damage				
	Tungsten Carbide (TC) inserts for needle holders and cutting instruments where applicable				
	3. Technical Specifications (Instrument Categories & Sizes)				
	The set shall include instruments in the following categories. All dimensions and configurations are approximate and non-binding, and equivalent standard commercial sizes shall be accepted provided clinical function is maintained.				
	3.1 Atraumatic Vascular Clamps				
	Bulldog clamp atraumatic: approx. 70 mm (or equivalent)				
	Neonatal vascular clamps (angled 30° and 45°): approx. 12 cm (or equivalent)				
	Atraumatic curved clamps: approx. 21.5 cm and 25.5 cm (or equivalent)				
	Atraumatic S-shape clamp: approx. 27.5 cm (or equivalent)				
	Atraumatic angled (Mixter-type) clamp: approx. 28.5 cm (or equivalent)				
	3.2 Tissue Forceps				
	Large jaw forceps: approx. 20 cm (or equivalent)				

	Toothed forceps (10×11): approx. 16 cm (or equivalent)				
	DeBakey forceps: multiple lengths (16 cm, 20 cm, 24 cm, 30 cm or equivalent range)				
	3.3 Retractors				
	Kocher retractor: approx. 40×10 mm, 22 cm (or equivalent)				
	Czerny double-ended retractor: approx. 17.5 cm (or equivalent)				
	Cushing hook: approx. 28 cm (or equivalent)				
	Desmarres vein retractor: blade approx. 16 mm, length 13 cm (or equivalent)				
	Kelly retractor: approx. 25×38 mm (or equivalent)				
	3.4 Scissors				
	Rib scissors (Giertz-Stille): approx. 27 cm (or equivalent)				
	Micro scissors (straight): approx. 18 cm (or equivalent)				
	Various surgical scissors (angled, curved, heavy-duty): 17–28 cm range (or equivalent)				
	DeBakey arteriotomy scissors: approx. 17.5 cm (or equivalent)				
	3.5 Needle Holders				
	Micro needle holders: 11 cm with different jaw diameters (or equivalent)				
	Ryder vascular TC needle holders: 13 cm, 15 cm, 18 cm, 23 cm (or equivalent)				
	3.6 Vascular Dilators				
	DeBakey dilators: Ø1.0 mm to Ø5.0 mm, approx. 19 cm (or equivalent graduated set)				
	3.7 Accessories				
	Rib spreader (adult): opening approx. 185 mm (or equivalent)				
	Surgical mallet: approx. 40 mm head, 750 g, 19 cm (or equivalent)				
	Kidney dishes, bowls, sterilization cases in standard surgical sizes (or equivalent)				
	4. Quality Standards & Certifications				
	The supplier shall provide products compliant with the following international standards:				
	ISO 13485 (Medical Devices Quality Management System)				
	ISO 9001 (Quality Management System)				
	CE Mark (European Conformity) or equivalent international certification				
	FDA approval (if applicable based on origin)				
	RoHS compliance (where applicable)				
	Declaration of Conformity (DoC)				
	5. Warranty				
	Minimum warranty period: **24 months from date of acceptance**				
	Warranty shall cover manufacturing defects and material failures				
	Includes replacement or repair of defective instruments				
	All replacement parts and labor shall be covered during warranty period				
	Response time for service support: **≤ 72 hours (recommended)**				
	6. Preventive Maintenance & Service				

	The supplier shall provide:				
	Guidance for cleaning, sterilization, and maintenance procedures				
	Availability of spare parts or equivalent instruments for at least **10 years**				
	7. Documentation (Mandatory)				
	The supplier must submit the following documents:				
	User, installation, and maintenance manuals				
	Technical datasheets for all instrument categories				
	Material composition certificates				
	Certificate of Origin				
	CE / ISO certificates				
	Sterilization and reprocessing guidelines				
	Declaration of conformity				
20	**Inverted Fluorescence Microscope**				
	1. General Description				
	A reliable inverted fluorescence microscope designed for routine laboratory applications, including:				
	Cell culture observation (including kidney cells)				
	Basic immunofluorescence applications				
	Evaluation of sample uniformity and consistency				
	Routine imaging and documentation				
	2. Optical System				
	Infinity-corrected optical system				
	Standard diffraction-limited optical resolution				
	Field of view ≥ 20–22 mm				
	Inverted configuration (objectives positioned below the stage)				
	3. Observation Modes				
	Brightfield				
	Phase Contrast				
	Fluorescence (limited to standard channels)				
	Differential Interference Contrast (DIC) *(optional)*				
	4. Objectives				
	Plan Achromat objectives *(Plan Apochromat optional)*				
	Magnifications: 4×, 10×, 20×, 40× *(60× optional)*				
	Numerical aperture suitable for routine imaging *(up to approximately 1.3)*				
	5. Fluorescence System				
	LED illumination source with long lifetime *(≥ 30,000–50,000 hours)*				
	Support for standard fluorescence channels *(e.g., DAPI, FITC, TRITC)*				
	Filter cubes with appropriate dichroic mirrors				
	Manual filter selection *(motorized optional)*				
	6. Stage and Focus System				
	Mechanical XY stage				
	Compatible with culture dishes and multiwell plates				
	Coarse and fine focusing mechanisms				
	Stable and precise manual focusing system suitable for routine use				
	7. Imaging System				
	Digital camera *(CMOS or CCD)*				
	Resolution ≥ 5 megapixels				
	Camera with high sensitivity and low noise suitable for fluorescence imaging				

	Global shutter or rolling shutter with fast readout capability suitable for live imaging applications				
	Minimum exposure time ≤ 1 ms				
	Live image display capability				
	Image capture and storage functionality				
	Basic image acquisition features				
	8. Environmental Conditions				
	Operation under standard laboratory conditions				
	No live-cell environmental control required				
	9. Software				
	Image acquisition software				
	Multi-channel fluorescence imaging support				
	Basic image analysis *(measurement, annotation, optional cell counting)*				
	Compatible with standard operating systems				
	10. Electrical Requirements				
	Power supply: 220–240 V AC, 50/60 Hz				
	11. Safety Requirements				
	UV protection shielding				
	Automatic light shut-off feature				
	Compliance with IEC 61010 or equivalent safety standards				
	12. Quality and Compliance				
	ISO 9001 certification				
	CE marking				
	RoHS compliance				
	ISO 13485 and FDA *(if applicable)*				
	13. Documentation (Mandatory)				
	The supplier shall provide:				
	User manual				
	Installation manual				
	Basic service documentation				
	Technical datasheet				
	Calibration information				
	Copies of relevant certificates				
	14. Warranty (Mandatory)				
	Minimum warranty period: **24 months** from the date of installation				
	Warranty shall include:				
	All parts and labor				
	On-site service and support				
	Replacement of defective components				
	Response time ≤ 72 hours				
	15. Training (Mandatory)				
	On-site training *(1–2 days)* covering:				
	End users *(operation and imaging)*				
	Technical staff *(basic maintenance)*				
	Training materials must be provided				
	16. Preventive Maintenance and Service				
	Basic preventive maintenance schedule				
	Availability of spare parts for at least **5 years**				
	Maintenance records recommended				
	Optional Annual Maintenance Contract *(AMC)*				
	17. Accessories				
	Computer workstation				
	Calibration slide				
	Standard fluorescence filter sets				

21	**Hemodialysis Water Treatment Plant (HD-WTP)**				
	Tender Document for 10 Dialysis Machines				
	1. General Description				
	The Contractor/Supplier shall design, manufacture, supply, install, test, commission, validate, and hand over a complete Hemodialysis Water Treatment Plant (HD-WTP) intended to produce ultrapure water suitable for hemodialysis applications.				
	The system shall be designed to serve a dialysis unit consisting of ten (10) hemodialysis machines with continuous, reliable, and safe operation in accordance with international dialysis water quality standards.				
	The supplied system shall include all equipment, accessories, piping, instrumentation, controls, electrical components, cooling systems, disinfection systems, and all necessary items required for complete and fully functional operation.				
	The HD-WTP shall be suitable for:				
	Conventional Hemodialysis (HD)				
	High-Flux Dialysis				
	Hemodiafiltration (HDF), where applicable				
	The complete system shall be designed for:				
	Continuous 24/7 recirculation				
	High microbiological safety				
	Ease of maintenance				
	Energy-efficient operation				
	Long-term operational reliability				
	2. Applicable Standards				
	The system shall comply with the latest editions of the following standards and guidelines:				
	Association for the Advancement of Medical Instrumentation Standards:				
	ANSI/AAMI RD52				
	ANSI/AAMI RD62				
	ANSI/AAMI/ISO 23500 Series				
	International Organization for Standardization:				
	ISO 23500 Parts 1–5				
	European Pharmacopoeia Requirements				
	World Health Organization Drinking Water Guidelines				
	CE MDR or equivalent international medical device certification				
	ISO 13485 certification for medical device manufacturing				
	3. System Capacity & Design Basis				
	The system shall be designed based on the following minimum criteria:				
	Number of dialysis machines :10 units				
	Average water consumption per machine :500–800 L/day				

	Estimated total daily demand :5–8 m^3/day				
	Design safety margin :Minimum 30%				
	Total design capacity: 7–10 m^3/day				
	RO production capacity : Minimum 500–700 L/hour				
	Operating duration : Minimum 16–20 hours/day				
	System operation : Continuous recirculation (24/7)				
	The Supplier shall verify all design calculations based on actual site conditions and raw water analysis.				
	4. Feed Water Requirements				
	The Supplier shall review available raw water analysis prior to final design.				
	The following parameters shall be considered during system design:				
	Hardness				
	Iron				
	Manganese				
	TDS				
	Turbidity				
	Free chlorine/chloramines				
	Silica				
	SDI				
	Microbiological contamination				
	If no water analysis is available, the Supplier shall clearly state all assumed feed water conditions.				
	5. Final Water Quality Requirements				
	The HD-WTP shall continuously achieve dialysis water quality compliant with AAMI/ISO standards.				
	Product Water Quality				
	Bacteria :< 0.1 CFU/mL				
	Endotoxins: < 0.03 EU/mL				
	Free chlorine: 0 mg/L				
	TOC :< 0.5 mg/L				
	Product water conductivity :≤ 5 µS/cm preferred				
	Alarm conductivity: >10 µS/cm				
	Online Monitoring (Mandatory)				
	Continuous online monitoring shall include:				
	Conductivity				
	Pressure				
	Flow rate				
	Temperature				
	Free chlorine				
	Tank level				
	Loop return conductivity				
	Monitoring locations shall include:				
	Post-RO Pass 1				
	Post-RO Pass 2				
	Storage tank				
	Distribution loop return				
	6. Pretreatment System				
	The pretreatment section shall include all necessary stages required to protect the RO membranes and ensure reliable operation.				

	6.1 Multimedia Sand Filter				
	The multimedia filter shall provide high-efficiency suspended solids and turbidity removal.				
	Requirements				
	Automatic backwash operation				
	Differential pressure monitoring				
	FRP or SS316L pressure vessel				
	Automatic control valve				
	Sampling ports				
	6.2 Iron Removal Filtration System (Mandatory)				
	A dedicated iron removal system shall be provided as a mandatory pretreatment stage.				
	Performance Requirements				
	Outlet iron concentration:<0.05 mg/L preferred				
	Maximum allowable :≤0.1 mg/L				
	Media				
	Acceptable media include:				
	Birm				
	Manganese Greensand				
	Katalox Light				
	Equivalent catalytic media				
	Configuration				
	FRP or SS316L pressure vessel				
	Fully automatic operation				
	Automatic backwash				
	PLC integration				
	Sampling ports (inlet/outlet)				
	Installation Location				
	The iron removal filter shall be installed:				
	After multimedia filtration				
	Before activated carbon filtration				
	6.3 Activated Carbon Filtration System (Safety Critical Stage)				
	A catalytic activated carbon filtration system shall be provided for complete removal of chlorine and chloramines.				
	Configuration				
	Preferred:				
	Dual Vessel (Lead/Lag)				
	Acceptable:				
	Single Vessel (subject to approval)				
	Requirements				
	Catalytic activated carbon media				
	EBCT ≥10 minutes at peak flow				
	Automatic backwash				
	Proper internal distribution				
	Mandatory Safety Features				
	Online free chlorine analyzer				
	Continuous monitoring				
	Audible and visual alarms				
	PLC integration				
	Performance Requirement				
	Outlet free chlorine concentration:				

	0 mg/L at all times				
	6.4 Water Softener				
	The softener system shall include:				
	Duplex configuration				
	Automatic regeneration				
	Continuous operation				
	Online hardness monitoring				
	Performance				
	Residual hardness:				
	<1 ppm as $CaCO_3$				
	RO shutdown shall occur upon hardness breakthrough.				
	6.5 Chemical Dosing System (Optional)				
	Where required, anti-scalant dosing shall be provided.				
	The dosing system shall:				
	Be interlocked with RO operation				
	Include chemical dosing pump				
	Include dosing tank and level monitoring				
	7. Reverse Osmosis (RO) System				
	Configuration				
	Dual Pass RO System (Mandatory)				
	Capacity				
	Minimum production:				
	500–700 L/hour				
	General Requirements				
	Membrane rejection ≥99%				
	SS316L high-pressure pumps				
	Duty/standby pump configuration				
	Automatic flushing system				
	CIP system				
	Online conductivity monitoring for each pass				
	Membrane integrity testing				
	Performance				
	Recovery rate :60–75%				
	SDI at RO inlet:<3				
	8. Post-Treatment System				
	The post-treatment system shall include:				
	UV sterilization (254 nm)				
	Endotoxin-retentive ultrafiltration (0.01 micron)				
	Optional ozone system (offline use only)				
	The ultrafilter shall be installed:				
	After UV unit				
	Before distribution loop				
	9. Storage & Distribution System				
	9.1 Storage Tank				
	The storage tank shall be sanitary SS316L construction.				
	Requirements				
	Capacity: 3000–5000 liters				
	Fully drainable conical bottom				
	0.2 µm hydrophobic vent filter				
	Spray ball for CIP				

	Level transmitter				
	Overflow protection				
	9.2 Distribution Loop				
	General Requirements				
	Continuous recirculation (24/7)				
	Ring loop configuration				
	SS316L electropolished piping				
	Hygienic sanitary fittings				
	No dead legs permitted				
	Design Criteria				
	Velocity:1.0–1.5 m/s				
	Loop turnover:6–10 times/hour				
	Compatibility				
	The loop shall be compatible with:				
	Thermal disinfection (80–85°C)				
	Chemical disinfection				
	10. Chiller System (Mandatory)				
	A dedicated industrial chiller system shall be provided for cooling the dialysis water distribution loop and storage system to minimize microbiological growth.				
	Performance Requirements				
	Loop temperature :20–25°C adjustable				
	Maximum allowable temperature :≤25°C				
	Ambient design condition :45–50°C				
	Chiller Components				
	The system shall include:				
	Air-cooled chiller				
	SS316L plate heat exchanger				
	Circulation pump				
	Expansion tank				
	Digital temperature controller				
	Monitoring & Control				
	The system shall include:				
	Online temperature monitoring				
	High-temperature alarm				
	PLC integration				
	Automatic operation				
	Thermal Disinfection Compatibility				
	The chiller shall automatically isolate or bypass during thermal disinfection cycles.				
	11. Disinfection System				
	The system shall include automated disinfection capability for:				
	RO system				
	Storage tank				
	Distribution loop				
	Methods				
	Preferred:				
	Thermal disinfection				
	Chemical disinfection:				
	Peracetic acid				
	Citric acid				

	Features				
	Automated cycles				
	Validation and logging				
	Safety interlocks				
	12. Control & Automation System				
	The system shall include a PLC-based control system with HMI touchscreen interface.				
	Monitoring Parameters				
	Pressure				
	Flow				
	Conductivity				
	Temperature				
	Free chlorine				
	Chiller status				
	Alarm status				
	Features				
	Alarm and fault logging				
	Data logging (minimum 12 months)				
	Temperature trending				
	Optional remote monitoring				
	User access control				
	13. Electrical System				
	Requirements				
	Power supply:				
	220–240V / 380–415V				
	50–60 Hz				
	MCC panel				
	Surge protection				
	UPS backup:				
	Minimum 60 minutes				
	14. Materials of Construction				
	Wetted Parts				
	Mandatory materials:				
	SS316L stainless steel				
	PVDF				
	Medical-grade PVC				
	Gaskets				
	EPDM				
	PTFE				
	Not Permitted				
	Galvanized steel				
	Industrial PVC				
	Low-grade plastics				
	Carbon steel in wetted areas				
	15. Compliance & Validation				
	The Supplier shall provide:				
	IQ / OQ / PQ validation				
	FAT				
	SAT				
	Water quality validation reports				
	Temperature validation				
	Continuous operation trial				
	Compliance Standards				

	ISO 13485				
	CE MDR (or equivalent)				
	AAMI / ISO 23500				
	Pharmacopoeia standards				
	16. Documentation Requirements				
	The Supplier shall provide:				
	PFD				
	P&ID				
	General Arrangement Drawings				
	Electrical Schematics				
	O&M Manuals				
	Spare Parts List				
	Validation Reports				
	PLC/SCADA Backup				
	Chiller calculations				
	As-built drawings				
	17. Warranty				
	Minimum Warranty Period				
	24 months from commissioning				
	Coverage				
	Mechanical components				
	Electrical components				
	Pumps				
	Instrumentation				
	PLC/control system				
	Conditions				
	Repair or replacement				
	Response time: 48–72 hours				
	18. Training Requirements				
	The Supplier shall provide on-site training covering:				
	Operation				
	Monitoring				
	Maintenance				
	Disinfection				
	Troubleshooting				
	Training Duration				
	Minimum 3–5 days				
	19. After-Sales Service				
	The Supplier shall provide:				
	Technical support				
	Emergency support				
	Spare parts availability for minimum 10 years				
	Optional Annual Maintenance Contract (AMC)				
	20. Vendor Qualification Requirements				
	The bidder shall demonstrate:				
	Experience with similar dialysis water systems				
	Availability of local technical support				
	Availability of spare parts and consumables				
	Qualified service personnel				
22	**HPLC System – Technical Specifications**				
	1. General Description				

	The HPLC system is a high-performance liquid chromatography system intended for use in a central analytical laboratory supporting pharmaceutical, environmental, food, chemical, and research applications.				
	The system shall provide:				
	High analytical sensitivity				
	Excellent reproducibility				
	High operational stability				
	Capability for continuous 24/7 operation				
	Compliance with international regulatory standards				
	The system must be from an established manufacturer such as Shimadzu Corporation or equivalent.				
	2. System Architecture				
	The system shall be a fully modular HPLC system.				
	Independent modules shall include:				
	Solvent Delivery Pump				
	Autosampler				
	Detector				
	Column Oven				
	Degasser				
	Modular design shall allow:				
	Easy maintenance				
	Future upgrades				
	Flexible configuration				
	2.1 Solvent Delivery Pump				
	Pump Type: Parallel dual plunger				
	Flow Rate Range: 0.0001 – 10.0000 mL/min				
	Flow Accuracy: ≤ ±1%				
	Flow Precision: ≤ 0.06% RSD				
	Maximum Pressure:				
	≥ 44 MPa (440 bar / ~6400 psi) for HPLC				
	Up to 130 MPa (1300 bar) for UHPLC				
	Gradient Modes:				
	Isocratic				
	Binary high-pressure gradient				
	Ternary gradient				
	Quaternary low-pressure gradient				
	Requirements:				
	Low pulsation solvent delivery				
	Automatic system diagnostics				
	Column protection flow control				
	2.2 Autosampler				
	Injection Volume: **0.1 – 50 µL (standard)**				
	Optional Volume: **up to 2000 µL**				
	Injection Accuracy: **≤ ±1%**				
	Injection Precision: **≤ 0.5% RSD**				
	Cycle Time: ≤ 7 seconds				
	Carryover: **≤ 0.002% (or better)**				
	Requirements:				
	High reproducibility				
	Automated sample handling				
	High-throughput capability				
	2.3 Column Oven				
	Temperature Range: **Ambient −10°C to 85°C**				
	Temperature Accuracy: **±0.8°C**				
	Temperature Precision: **±0.1°C**				
	Heating: Forced air circulation				

	Cooling: Electronic cooling system				
	2.4 Detector (UV-Vis / PDA)				
	Type: UV-Visible or Photodiode Array (PDA)				
	Wavelength Range: **Minimum 190 – 700 nm**				
	Wavelength Accuracy: **±1 nm**				
	Wavelength Reproducibility: **±0.1 nm**				
	Photometric Range: **0.0001 – 4.0 AUFS**				
	Baseline Noise: **≤ 4 × 10^{-6} AU (typical)**				
	Light Source: Deuterium lamp				
	2.5 Degasser				
	Number of Channels: Up to **5 solvents**				
	Degassing Method: Vacuum membrane				
	Capability: Suitable for standard HPLC flow conditions				
	2.6 System Controller				
	Central system controller with touchscreen interface				
	Fully integrated system control software				
	Expandable architecture				
	2.7 Chromatography Software				
	Software: LabSolutions or equivalent				
	Must include:				
	Chromatogram acquisition and processing				
	Quantitative & qualitative analysis				
	Audit trail functionality				
	User access control				
	Electronic signatures				
	Full compliance with **GLP / GMP and FDA 21 CFR Part 11**				
	3. Performance Requirements				
	Retention time reproducibility: **≤ 0.1% RSD**				
	Injection precision: **≤ 0.5% RSD**				
	Carryover: **≤ 0.002%**				
	Baseline noise: **≤ 4 × 10^{-6} AU**				
	High sensitivity and resolution				
	Stable baseline performance				
	Suitable for continuous **24/7 unattended operation**				
	4. System Compliance & Standards (Mandatory)				
	4.1 Manufacturer Requirements				
	Minimum **10 years proven experience** in HPLC/UHPLC manufacturing				
	Global installation base in regulated laboratories				
	System must be **currently manufactured (not discontinued)**				
	4.2 Certifications				
	ISO 9001 certification required				
	ISO 13485 preferred				
	Compliance with:				
	GLP / GMP				
	FDA 21 CFR Part 11				
	CE / IEC electrical safety compliance				
	4.3 Documentation Requirements				
	Supplier must provide:				
	Original manufacturer datasheets				
	Full technical compliance statement (point-by-point)				
	Installation and operation manuals				
	4.4 System Validation				
	IQ (Installation Qualification)				
	OQ (Operational Qualification)				
	Optional PQ (Performance Qualification)				

	On-site validation by supplier is mandatory				
	4.5 Performance Verification				
	Supplier must provide certified proof for:				
	Flow accuracy				
	Retention time reproducibility				
	Injection precision				
	Carryover level				
	Detector baseline noise				
	4.6 After-Sales Support				
	Authorized local service support				
	Response time ≤ **48 hours**				
	Spare parts availability ≥ **10 years**				
	Preventive maintenance program required				
	4.7 Training				
	On-site user training mandatory				
	Training certificates must be provided				
	4.8 Warranty				
	Minimum2**year full warranty** (parts & labor)				
	Option for extended service contract				
	Conclusion				
	The offered HPLC system shall fully comply with all above specifications. Any deviation must be clearly stated and justified. Non-compliant or undocumented systems will be rejected.				