INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

MATERIALS MANAGEMENT DIVISION

Powai, Mumbai - 400076

PR No. 10000369693 **Rfx No. 6100001655**

Technical Specifications for Pressure Retarded Osmotic (PRO) Setup (Qty-1)

Sr. No.		Content	Compliance (Yes/No)
1	**Technical Specification:**	1. The system must contain 2 membrane PRO cells (plate and frame type with an area of 140 cm^2 each; maximum feed flow rate: 300 L/hr; maximum pressure: 30 bar). Each cell must include 2 external endplates of 316-grade stainless steel and 2 sealing gaskets of synthetic rubber polymer. Both cells are to be hydraulically connected to one feed stream and a high salinity stream. The system should be capable of being operated with different membranes, however, one unit of cellulose triacetate with an appropriate area must be supplied. 2. The equipment should be capable of being operated with a single cell or with both simultaneously in series and in parallel with necessary valves - two needle valves to be placed on the high salinity streamside at the output (one per cell). The pressure should be controlled at the inlet and outlet of each cell with 8 pressure gauges (0 – 40 bar) and an arrangement to monitor and control the temperature with sensors at the inlet of each cell should be provided. 3. The system should include the jacketed and dosing tanks with high-pressure pumps with a discharge of 300 L/hr. In addition, there should be a minimum of 3 dosing pumps of 20L/hr capacity. The system should be monitored by 3 conductivity meters. 4. 4 no. flowmeters to measure the flow rate at the entrance of the cells (2 for the low salinity stream, 2 for the high salinity stream) are required in the system.	--

		5. Measurement scales of 1-10 kg with 0.1 g accuracy to be included in the system for quantification of permeate in each cell. 6. All steel used must be 316-grade stainless steel. Hydraulic line, control cabinet (IP65 rated) with a display of varying parameters (pressures, velocities, temperature) and push buttons for controls. 7. For assembly of the equipment, a portable skid with wheels made of anodized aluminum must be included. The size of the entire unit should be compact ~ about 2.0 x 1.5 x 2 m.	
2	**Terms and Conditions:**	i. The supplier should have proven prior experience in such PRO system design, development, and supply to any government entities or educational institutions. ii. The supplier should have proven wide experience in the tailor-made design of different membrane technologies equipment. iii. The supplier must implement, maintain, and constantly improve a quality and environmental management system in accordance with the requirements of the international standards UNE-EN ISO 9001 and UNE-EN ISO 14001, respectively. iv. The manufacturer/authorized service personnel will have to provide remote support for any technical issues throughout the life of the equipment. v. The supplier must provide a tailor-made manual including: a. Detailed technical documentation of the equipment supplied (list of components, P&ID, electrical scheme, characteristics of its components, calibration documents, etc.) b. Operation guidelines (start-up of the system, PRO operation, system shutdown, and system disconnection with safety information included)	

		c. Maintenance guidelines (including cleaning protocols) d. Troubleshooting guidelines (leakage/breakage of hydraulic lines and/or tanks and electrical/power failure or mechanical breakdown) e. Certificate of compliance vi. The supplier should provide technical assistance by a team of highly qualified professionals. vii. The supplier must warranty the equipment supplied against any defect of manufacture, for a period of three (3) years from its delivery, installation, Commissioning, and acceptance on-site. viii. To ensure quality and compliance with specifications and contractual requirements for equipment, Factory Acceptance Testing (FAT) should be performed by the manufacturer prior to shipping. ix. Installation, Packing, Statutory Clearances & Freight: To be Included in the quoted price, if any. x. Payment: 100% within 30 days after successful Delivery, Installation, Commissioning and Acceptance.	