LIST OF ITEMS

Sr. No.	Item / Description	Quantity
01	**TAN & TBN AUTOTITRATOR** **MODEL:** Metrohm 848 Titrino Plus with Computer Control (with all Standard Parts and Accessories) or Equivalent. **ORIGIN:** European, Japanese **SPECIFICATIONS:** (Enclosed as Annexure-A)	02 Set
02	**KARL FISCHER AUTOTITRATOR** **MODEL:** Metrohm 852 Titrando with computer control (with all standard parts and accessories) or Equivalent. **ORIGIN:** European, Japanese **SPECIFICAITONS:** (Enclosed as Annexure-B)	01 Set
03	**SAMPLE INJECTION DEVICE** **MODEL:** Metrohm 860 KF Thermoprep (with all standard parts and accessories) or Equivalent. **ORIGIN:** European, Japanese	02 Set
	TERMS AND CONDITIONS: 1. Supplier will provide the operating and maintenance manual. 2. Installation & Commissioning will be the responsibility of the supplier at site. 3. Supplier will provide all required chemicals. 4. Warranty period will be 3 years.	

TECHNICAL SPECIFICATION FOR TAN/TBN AUTOTITRATOR

#	PARAMETERS		SPECIFICATION
1	Titration Mode		a) Dynamic Equivalence Point Titration (DET) b) Monotonic Equivalence Point Titration (MET) c) End Point Titration (SET)
2	Working Medium		Non-Aqueous (For TAN & TBN analysis)
3	Reference Test Method		ASTM (D664, D2896, D4739, D3237)
4	Measuring Mode		pH & Voltage
5	pH Mode	Range	-13 to +20
		Resolution	≤0.001
		Accuracy	±0.003
6	Voltage Mode	Range	-1200 to +1200 mV
		Resolution	≤0.1 mV
		Accuracy	±0.2 mV
7	Polarizable Electrode Measuring Mode		a) Adjustable polarization Current (Ipol) b) Adjustable Polarization Voltage (Upol)
8	Measuring Mode Ipol	Pol. Current	-120 to +120 µA
		Meas. Range	-1200 to +1200 mV
		Resolution	≤0.1 mV
		Accuracy	±0.2 mV
9	Measuring Mode Upol	Pol. Voltage	-1200 to +1200 mV
		Meas. Range	-120 to +120 µA
		Resolution	≤0.01 µA
10	Dosing Derive Resolution		≥10,000 steps per cylinder volume
11	Exchange Unit Cylinder Volume		Minimum 1 ml and Maximum 50 ml
12	Working Condition		Upto 85% humidity
13	Stirrer Control		Magnetic Stirrer with base plate, support rod and electrode holder
14	Warranty Period		3 Years

TECHNICAL SPECIFICATION FOR KARL FISCHER AUTOTITRATOR

#	PARAMETERS		SPECIFICATION
1	Measuring Principle		Dual System (Coulometric & Volumetric)
2	Water Content Measuring Range for Coulometric method		≤10 µg to ≥100 mg
3	Water Content Measuring Range for Volumetric Method		≤100 mg to 100%
4	Sample Matrix		Lubricating Oil, Hydraulic oil, Mineral oil and other petroleum products
5	Measuring Cycle		≤100 ms (milliseconds)
6	Generating Electrode (I_{max})		≥400 mA
7	Indicator Electrode	Measuring Mode	Determination with adjustable Ipol
		AC	5, 10, 20, and 30 µA
		DC	-125 to +125 µA
8	Temperature Sensor	Type	Platinum
		Range	Upto 250 °C
		Resolution	≤0.1 °C
		Accuracy	±0.2 °C
9	Measuring Mode		a) Adjust. Polarization Current Ipol b) Adjust. Polarization Voltage Upol
10	Polarization Current	Current	-122.5 to +122.5 µA
		Range	-1200 to +1200 mV
		Resolution	≤0.1 mV
		Accuracy	±0.2 mV
11	Polarization Voltage	Voltage	-1225 to +1225 mV
		Range	-120 to +120 µA
		Resolution	≤0.1 µA
12	Working Condition		Upto 85% humidity
13	Controller		Software control through computer
14	Dosing Device		Connection for a max of 4 external dosing devices
15	Stirrer Control		Connection for a max of 4 stirrers and switching on/off manually and also coordinated with the titration sequence.
16	Sample injection Method		Injection of sample should be thermally through oven heated method