**Amendment – Phase-1**

| Sr. No. | Name of the Equipment | Quantity | Technical Specification | Location |
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| 01 | Tear Tester - Digital Model | 01 | • Purpose: To measure the force required to propagate an existing slit a fixed distance to the edge of the test sample.<br>• Should comply with Standards IS 1060; ISO 1974,6383-2, 9290; ASTM D295, D752, D1424, D1922, D5734 ASTM D1922; TAPPI T414, T496<br>• 7" full-color digital touch screen display<br>• Standard Impact Head:<br>• Radius: 0.5 inches (12.7 mm)<br>• Diameter: 0.75 inches (19.0 mm)<br>• O-Ring Clamp:<br>• Inside Diameter: 89 mm<br>• Sample Size:<br>• 5 x 5 in (127 x 127 mm) square<br>• 5.25 in (133.35 mm) diameter circle<br>• Air Clamp Assembly: Min. 60 PSI<br>• Pendulum: Universal with interchangeable weights (200, 400, 800, 1600, 3200 and 6400 gram)<br>• Pneumatic clamps and pendulum release<br>• Automatic calibration of pendulum<br>• Units: Selectable [Percentage (%), Millinewtons (mN), Grams-force (gf), Poundsforce (lbf)]<br>• Sample statistics: Average, High/low results, Standard deviation<br>• Output: USB flash drive, USB ESC/POS printer,<br>RS232<br>• Power: Single phase; 220/240 V; 50/60 Hz<br>• Storage and editing of up to 200 readings<br>• Report printout with optional printer | Ahmedabad |
| 02 | Die Punch for Sample Preparation (Tensile Strength, FCT) /Automatic Sample Cutter as per ISO/ASTM | 01 | To obtain specimen by punching, using hollow dies of different sizes and contours. Interchangeable socket punches with different profiles and size according to the customer needs. Should be made of steel with hand finished cutting edges and provided with ejector for easy removal of the specimen after punching. Conforming to IS 1060, IS 2508, ASTM D 638, ASTM D 882 | Ahmedabad |
| 03 | Grammage Sample Cutter (Hydraulic/automatic) | 01 | Grammage Sample Cutter is used to quickly and precisely cut samples of standard area. It is the special sample taker of grammage measurement for paper and cardboards. Sample Area: 100cm² Accuracy: ±0.35cm² | Ahmedabad |

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| | | | Sample Thickness: (0.1~1.0) mm Conforming to Standards ISO 3801, ASTM D3776 / 2646, BS 3424 / 2471 | |
| 04 | Vacuum Leakage Tester | 01 | Automation Grade: Automatic<br>Display Unit: Bar, Kpa<br>Accuracy: 0.035 Pa | Ahmedabad |
| 05 | Handle Pull Strength Tester | 01 | • Machine Capacity: 100 Kgf, Least Count: 5 gm<br>• Type: Constant Rate of Traverse CRT Type<br>• Grip to Grip Separation: Minimum 25 mm and Maximum: 500 mm. Three sets supplied with the machine<br>• Load Sensor: Universal 'S' Type / Pancake Type, high sensitivity with linearity feature and long term repeatability<br>• Load Sensor Accuracy: +0.5% of the Load Cell capacity. Calibrated by NPL approved proving ring / dynamometers<br>• Load Sensor Sensing: Auto - detect / sensing through advance electronics, Electronic Auto-Zero<br>• Over Load / Travel Safety: Auto stop through software 10% above load cell capacity / Built in<br>• Systems Controls: Advance Micro-controller systems tensile card - 1927 or 945a, 16bit ADC & DAC<br>• Power Requirement: Stabilized, 220-240 V AC, 50 Hz, Single Phase | Ahmedabad |
| 06 | Platform type Weighing Balance | 01 | • Size: 1000 mm x 1000 mm<br>• Capacity: 1 ton<br>• Digital type<br>• Load cell: 4 nos.<br>• Accuracy: 100g<br>• Three years warranty plus five years AMC after the warranty period | Ahmedabad |
| 07 | Water Vapour Transmission Tester (WVTR) Imported | 01 | Water Vapour Transmission Rate Tester, capable of detecting WVTR transmission through plastic films, laminated films, sheets as well as various materials used in food packaging applications. The instrument should also be capable of detecting water vapour transmission rate through PET bottles, retort pouches and other food packages.<br>• Compliance Standards: New ASTM F3299, ASTM F1249, ISO 15106-3, DIN 53122-2.<br>• Two test chambers.<br>• Precise temperature control on each chamber: 10 Deg. C to 40 Deg. C. | Ahmedabad,Mumbai |

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| | | | • Automatic gas flow control and precise humidity control on the wet side, 20% - 90%.<br>• Measurement range: 0.005 to 1000 g/m2/day.<br>• Sample Size: 50 cm2 & 100 cm2<br>• Carrier Gas Requirement: 100% Dry N2.<br>• Windows software.<br>• Grease or Film Sealant.<br>• Nitrogen Purifier.<br>• Calibration Film for low range and high range.<br>• Analytical systems manufactured traceable to NIST.<br>•System validation with certified gas or film for speed and convenience.<br>•Flow, temperature and humidity control for ultimate responsiveness and repeatability.<br>•Minimum two NIST calibration films to be supplied along with the equipment.<br>•HP, Dell, IBM branded PC with Licensed Windows Software and Laser Printer.<br>Intuitive Windows based software.<br>Operating Manual. | |
| 08 | Moisture Sensor P2O5 for Water Vapour Transmission Rate (WVTR) Model No.M7001 | 01 | P2O5 based Moisture Sensor for Water Vapour Transmission Rate (WVTR) Model No.M7001 of Systech Make. | Kolkata |
| 09 | Nitrogen Purifier Unit for Water Vapour Transmission Rate (WVTR) Model No.M7001 | 01 | Nitrogen Purifier for Water Vapour Transmission Rate (WVTR) Model No.M7001of Systech Make | Kolkata |
| 10 | OTR (Oxygen Transmission Rate) Tester - Imported | | Oxygen Transmission Rate Tester - Oxygen Permeation Analyser as per following standards: ASTM F2622-08, ASTM D3985, ASTM F1307, ASTM F1927, ISO 15105-2, DIN 53380, JIS K-7126, etc.<br>Oxygen permeation analyser for films.<br>OTR measurement range: 0.01 to 432,000 cc/m2/day.<br>Precise humidity control on both Oxygen and Nitrogen side.<br>Two test chambers with precise Temperature control on each chamber. | Kolkata, Mumbai, Ahmedabad |

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| | | | Electronic flow control for Oxygen and Nitrogen.<br>Sample Size: 50cm2<br>Carrier Gas Requirement: 100% Dry O2 and Dry N2.<br>Grease or Film Sealant.<br>Nitrogen Purifier.<br>Calibration or Reference Film for low range and high range.<br>Analytical systems manufactured traceable to NIST.<br>System validation with certified gas or film for speed and convenience.<br>Flow, temperature and humidity control for ultimate responsiveness and repeatability.<br>HP, Dell, IBM branded PC with Licensed Windows Software and Laser Printer.<br>Intuitive Windows based software.<br>Operating Manual. | |
| 11 | Automation Stock load tester | 1 | As per IS/ASTM standards | Mumbai |
| 12 | Automation of Drum Drop Tester | 1 | As per IS/ASTM standards | Mumbai |
| 13 | Refrigerator | 1 | 1. Capacity of the refrigerator in liters: 350-380<br>2. Temperature range in °C: 1°C to 10°C throughout the chamber or better<br>3. Control panel settings:Thermometer , Main switch and temp selection<br>4. Temperature Control: Microprocessor based temperature controller<br>5. Type of Door: Single door<br>6. Material of Construction of body: Galvanized steel<br>7. Insulation material: High grade foam material<br>8. Outside finish: Epoxy coated finish<br>9. Should have digital display of temperature<br>10. Rotary air circulation to maintain temperature uniformity<br>11. Refrigerator should be frost free and CFC free<br>12. Flouroscent internal light available | Mumbai |

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| | | | 13. Power supply: 220-240 V , 50 Hz Single phase<br>14. Door locking system for improved security with magnetic door gasket<br>15. Refrigerator Energy star rating: 3 or better<br>16. Material used for shelves: Toughened glass<br>17. Number of shelves: 3 or 4<br>18. Refrigerator shall be hermentically sealed<br>19. Voltage stabilizer to be supplied<br>20. Material of Inner chamber: SS 304<br>21. Warranty of the refrigerator in years: 3<br>22. Compressor shall be low noise and vibration proof<br>23. Warranty of Compressor in years: 5 | |
| 14 | Gas Flow meter with frame | 9 | Standard | Mumbai |
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**Modified specification for TGA**

1. The instrument must operate to temperatures upto 1000 °C or more with scan rates of 100 °C/min or better.

2. The TGA should have Ultra Microbalance with 0.1 µg sensitivity and weighing precision better than 0.01%. and with vertical thermobalance and horizontal purge gas system.

3. The Weighing range should be upto 1000 mg or better.

4. The system should have Low Thermal Mass Furnace with built-in Platinum or ceramic furnace which is resistant to inert and oxidative gas over the full temperature range. The furnace should have facility of auto-calibration, auto-clean furnace etc.

5. The system have the ability or upgradation provision to operate in a vacuum to $10^{-5}$ Torr or have provision to and should have capability to use various types of inert and active gases.

6. The Furnace should cool down to room temperature from 1000 °C in 15 minutes or better.

7. The furnace area should be visible

8. The Gas control should be mass flow control (balance purge and sample purge)/electronic flow and must be able to changeover from one gas to another.

9. The Balance assembly should have thermostatting capability to minimize isothermal drift.

10. It should be supplied with platinum as well as ceramic pans (5 qty. each).

11. The system must be delivered with at least 5 traceable standards to allow calibration

12. The movement of furnace should be software controlled. Furnace should be protected with chamber sleeve to avoid convection effects.

13. The TGA should have provision for upgradation into Hyphenated technique with FT-IR or MS for evolved gas analysis studies.

14. The system should be supplied with licensed software and latest Branded PC and Colour Laser-Jet Printer.

15. Branded 2 KVA online UPS with 30 Minutes battery backup

16. The Software should be using MS-Windows Environment and should have all the parameters for Instrument Control, Method storage, Multi Ramp capabilities etc.

17. The Software must have a real time reference curve capability

18. The Software must have real time calculation capability

19. The Software must be able to save several different data files into one file

20. The software package must include all the data analysis functions, mathematical operations and calculation options for Thermal Analysis, Auto stepwise TGA and Decomposition Kinetics etc.

21. A list of reputed institution/ organization in India, where similar systems/model have been installed, must be provided. Your post sales service feedback should be good.

**List of Library Books**

| S.No | Title | Author | Publisher | Copies |
|---|---|---|---|---|
| 01 | Pira Report | | Rira Publisher | 1 |