

Technical Specification for Testing Equipments (S. No.01 to 20)

1

ATOMIC ABSORPTION SPECTROPHOTOMETER WITH FLAME AND GRAPHITE FURNACE & STANDARD SOLUTIONS

<u>Technical Specification</u>		
Make		
Model		
S. No	Items	Specification
1	Atomizer System	A compact integrated dual atomizer system with inbuilt flame and furnace atomizers. Changeover from Flame to Furnace mode and vice-versa should be automatic and controlled through the software. Furnace autosampler should be permanently aligned with the system with no manual changeover. The vertical and horizontal alignment (if needed) of the flame burner head in the light beam should be Motorized automatic through the software. Separate 10 cm titanium burner head for Air – Acetylene flame and 5 cm titanium burner head for Nitrous oxide – Acetylene flame should be supplied with the system. AC Longitudinal Zeeman Background correction and D2 correction for GF to have higher light through put. The Furnace Autosampler must be integrated to main Spectrometer with a minimum of 60 sample positions. The system should be equipped with an integrated graphite furnace camera as a standard for easy autosampler tip alignment and real time viewing of the process happening in graphite furnace. The GF system should be supplied with pyrolytically coated graphite tube, integrated platform, rapid furnace heating (up to 3000 oC/s). An imported air compressor and an imported recirculating water chiller unit of appropriate capacity for cooling of Graphite Furnace must be quoted by the manufacturer. Auto Sampler for flame should be quoted in option.
2	Lamps	The system should have a minimum 6 lamp holder with a provision of automatic lamp selection .Built-in power supplies for Coded Hallow Cathode Lamps that are used for the analysis of volatile elements like As, Pb, Hg, Se, etc. (HCL's or other types of specific lamps should be quoted for specific elements if required.) Lamps & Standards for elements Lead, Cadmium, Arsenic, Tin, Mercury, Copper, Zinc, Aluminum, Iron, Titanium, Chromium, Selenium.
3	Sample Introduction System	A high sensitivity nebulizer system including impact bead with corrosion resistant against the acids like 5% hydrofluoric acid, hydrochloric acid and Nitric Acid. Corrosion resistant spray chamber.

4	Optical System	A double beam spectrometer system with high light throughput optical system with a diffraction grating ruling density of atleast blazed in both UV and Visible regions. Reciprocal linear dispersion 0.5 nm/mm at 200 nm. Optical resolution should be available as 0.1nm for better sensitivity at UV region.
5	Detector	Photomultiplier Tubes (PMT) or Solid State Detector, Wavelength range: 185 – 900 nm
6	Background Methodology	Correction AC Zeeman Background Correction for the Graphite Furnace with the magnetic field applied along optical path should be available
7	Gas Flows system	Software controlled gas flow and automatic changeover of oxidant flow from air to nitrous oxide when switching to or from air-acetylene to nitrous oxide – acetylene flame.
8	Additional Features	All safety interlocks built-in and additional feature like Burner Head Interlock, Nebulizer/End Cap Interlock, and Drain Interlock to be built-in.
9	Sensitivity	Greater than 0.8 absorbance with the precision of <0.5% RSD from 5 second integrations for 5 ppm Cu standard
10	Hydride Generation Accessory	The atomic absorption spectrometer system should be incorporated with automatic Hydride generation system for the analysis of volatile elements like As, Se, Hg, etc. with best sensitivity and achievable detection limits.
11	Software	Programmed facility with multitasking software should provide complete control of instrument with instrument status display and its various accessories. Provide Accurate and reproducible time averaged, integration, non-averaged integration, multilevel calibration. Software should handle instrument linear absorbance reading, concentration or emission intensity, integration time, built in statistics, calibration equation control, slope of analytical curve using operator selective calibration standard. Built in interface for computer connection and use of optional accessories.
12	Gas Purifications Panel.	Std. Gas Purification panel should be quoted.
13	Computer System	Latest Windows 7 based, Reputed Branded Computer with B/w Laser Jet Printer
14	UPS	Suitable UPS system with 30 Minutes Battery Backup facilities should be offered in Option.
15	AMC	2 Years Annual Maintenance Contract after completion of 1 year Warranty period should be offered.
16	Training	10 days training for complete operation of instrument during the warranty period should be offered separately for Onsite & Manufacturer's Application Lab in India including Lodging, Boarding, Training charges. minimum for 2 persons
Any other Accessories required for installation and successful operation of offered machine should be offered in the offer.		

Offered quoted Instrument should be latest instrument from the manufacturer from his current Product Line.		
Manufacturer should be having a facility to provide after Sales and Service in Bangalore or at least in Karnataka or near by for faster response and reducing Down time of Machine.		
AAS Lamps & Following Standards 1000 PPM 100 ml with NIST Traceability: Lead - Pb, Cadmium - Cd, Arsenic - As, Tin - Sn, Mercury - Hg, Copper - Cu, Zinc - Zn, Aluminum - Al, Iron - Fe, Titanium - Ti, Chromium – Cr, Selenium- Se.		
17	Other Mandatory Items	While supplying the Machines, the supplier should also provide the following items apart from above: <ul style="list-style-type: none"> • Hard copies of Operational & Service Manual- 01 Set . • with NIST Traceability Calibration certificates for Standard solutions as mentioned above • Machine should come with all other essential accessories & spares required for installation, commissioning& Operation.

2

AIR PRESSURE LEAKAGE TESTER

Technical Specification		
Make		
Model		
S. No	Items	Specification
QUANTITY		1
TYPES OF TESTS TO BE PERFORMED		For Air Pressure Leakage test of Containers against air pressure for containers used packing of drinking water of sizes 300ml to 20Ltrs capacity as per IS - 15410
1	Applicable Standard	IS 2798 Clause 6.3 & IS 15410
2	Capacity	Pressure Range 50Kpa or more,Accuracy +/-2 Percent
3	Features	Digital display for test pressure It should be equipped with variable Pressure Regulator
4	Power Supply	250V,50Hz
5	Accessories	Water Reservoir of Min Size for Width 500mm,Height 600mm, & Depth 600mm Which is made of SS 304 sheet of sufficient thickness to make rigid,rust free & leakage free.

6	Other Mandatory Items	<p>While supplying the Machines, the supplier should also provide the following items apart from above:</p> <ul style="list-style-type: none"> • Hard copies of Operational & Service Manual-01 Set . • NABL/NIST Traceable Calibration certificate for the applicable parts of equipment . • Different attachments required for testing of different capacity containers upto 20Ltr capacity. • Machine should come with all other essential accessories & spares required for installation, commissioning & Operation.
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3

Automatic Hydrostatic Pressure Tester With End Caps & 02 Nos Water Bath

Technical Specification		
Make		
Model		
S. No	Items	Specification
QUANTITY		1
TYPES OF TESTS TO BE PERFORMED		For determining the strength of thermoplastic pipes when subjected to a constant hydrostatic internal pressure at a constant ambient temperature either for a specified period or until they fail. The test duration is subject to the tension generated by the internal pressure and the temperature.
APPLICABLE STANDARD		ISO 13479, ISO 1167-2, ISO 6108 & IS-4984
Technical Specification of Pressure tester		
S.No.	CHARACTERISTIC / DESCRIPTION	REQUISITION REQUIREMENTS
1	Pressure Range	100 bar
2	Resolution	0.01 bar
3	Number of Station	05 Station
4	Pressure transducers	10 bar-01 No, 60 bar-02 nos, 100bar-02 nos
5	Accuracy class for pressure transducer	0.25% of full scale of pressure transducer or better

6	Features	<p>The machine and the computer should display the time, pressure and all testing conditions</p> <ul style="list-style-type: none"> <input type="checkbox"/> Quick connected couplings for connecting test samples <input type="checkbox"/> Integrated high-pressure pump <input type="checkbox"/> Pressure regulation via microprocessor controller System <input type="checkbox"/> Controller with two-line LCD display <input type="checkbox"/> Overtemperature shutdown <input type="checkbox"/> Interface for chiller/heat exchanger <input type="checkbox"/> Pressure Transducers of suitable capacity as mentioned above. <input type="checkbox"/> Automatic Temperature controller interfacing with Water bath <input type="checkbox"/> Data interface to internal programs via PC <input type="checkbox"/> The machine should observe, analysis, inquire, save, print, testing Curve (pressure-time) and starting time, setting time, current time, valid time, invalid time, remaining time, over pressure time, pressure compensating time and etc.
7	Accessories	<ul style="list-style-type: none"> <input type="checkbox"/> Stainless steel pressure reservoir (Material of good construction (to be declared by vendor))

Technical Specification of Water Tank -02 Nos

1	Water temperature range of Tank	<p>From (+) 0°C or lower to (+) 50°C-1No</p> <p>From (+) 30°C to (+) 100°C-1No</p>
2	The Temperature Controlling Accuracy of test tank	±1.0°C
3	Temperature Regulating accuracy	±0.1°C
4	Tank Type	<p>02 Nos of Tank of best quality material with an Inner Size</p> <p>suitable to accommodate Minimum 06 Nos of test samples of 400mm Dia Pipe for pressure testing.</p>
5	The Working Time of the Timer	0-9999h or better
8	Timer Display Accuracy	1Sec
6	Features	<ul style="list-style-type: none"> <input type="checkbox"/> Auto monitoring of water level & Circulation System <input type="checkbox"/> Automatic top-up <input type="checkbox"/> Integrated heaters <input type="checkbox"/> Water cooling system/Chiller <input type="checkbox"/> Connection and interface for chiller/heat exchanger <input type="checkbox"/> Automatic Temperature controller with digital temp and time display <input type="checkbox"/> Data interface to internal programs via PC

7	Accessories	Chiller of suitable capacity for Cold Tank of range (+) 0°C or lower to (+)50°C
		Enclosures/End Caps suitable for fittings of PE Pipes of sizes Upto 400mm as per IS-4984 - 01 set each for each sizes
		Enclosures/End Caps suitable for fittings of PVC Pipes of sizes Upto 315mm as per IS-4985 - 01 set each for each sizes
8	Other Mandatory Items	<p>While supplying the Machines, the supplier should also provide the following items apart from above:</p> <ul style="list-style-type: none"> • Hard copies of Operational & Service Manual- 01 set . • Calibration Certificate with traceability for required parameters like pressure, temperature & timer. • Machine should come with all other essential accessories & spares required for installation, commissioning & Operation.

4

Automatic KARL FISCHER TITRATOR

<u>Technical Specification</u>		
Make		
Model		
S. No	Items	Specification
1	Principle of Operation	Coulometric Karl Fischer Titration Principle of In-situ generation of Iodine at Cathode electrode using Pyridine free Coulometric Karl Fischer Reagent.
2	Feature of Instrument	The instrument shall be capable of working with both common solution for anode and cathode as well as with separate solutions for anode and cathode for Coulometric titration
		The instrument shall have facility for Manual injection of sample as well as through auto sampler.
3	Moisture Content detection Range	0 to 100 PPM or better
4	Detection sensitivity/ Resolution	0.1 µg or better
5	End point detection	AC polarization potentiometric detection method
6	End point Indication	End point indication through visual display and acoustic beep
7	Dispenser	Motorized Dispensing
8	Electrode	Dual Platinum Electrode.
9	Titration Vessel	Titration Vessel shall have a low drift cell design with air/moisture ingress free fittings
10	Titration Vessel Capacity	150mL (min.usage: approx. 100mL)

11	Drift compensation	Drift compensation – The instrument shall have Automatic drift compensation
12	Calculation	Automatic calculation of results with desired unit of expression (Concentration, %, W/W, W/V, PPM, g/L)
13	Measurement Unit	The unit of measurement shall be Selectable from – µg, mg/kg, ppm or %
14	Spares and consumables	2 Nos. of electrode set All consumables required for installation and standardization of system
15	Other features	In-Built Flushing System for cleaning dispensing path. A small glass/ teflon tube - closed at one end and fitted at the other with a rubber stopper should be provided for weighing and introducing into the titration vessel
16	Power Supply	Power input to be 220-240VAC, 50Hz fitted with Indian plug Voltage corrector/stabilizer of appropriate ratings meeting ISI Specifications.(Input 160-260 V and output 220-240 V and 50 Hz)
17	Installation & training	Comprehensive training for lab staff and support services till familiarity with the system
18	Other Mandatory Items	While supplying the Machines, the supplier should also provide the following items apart from above: <ul style="list-style-type: none"> • Hard copies of Operational & Service Manual-01 Set . • Traceable Calibration certificate of equipment apart from Inspection Certificate. • Machine should come with all other essential accessories & spares required for installation, commissioning& Operation.

5

AUTOMATIC MELT FLOW INDEX TESTER With PC & Software

Technical Specification		
Make		
Model		
S. No	Items	Specification
	Quantity	01No
	Make & Model	To be specified by Bidder
	Make & Model	To be specified by Bidder
	Reference Standard	ASTM D 1238 (Method A,B,C&D) & ISO 1133
TECHNICAL SPECIFICATION		
	Temperature Range	Working range 30 to 400°C

	Accuracy	± 0.1 °C
	Timer	Digital timer with a range of 999.9 sec or better with buzzer indication facility.
	Temperature Controller	Electrically heated with Microprocessor based PID Digital Temperature Controller
	General requirement	Corrosion resistance piston and barrel inert to the test materials confirming to ISO 1133& ASTM D1238 with dimensional conformity Traceable certificate.
	Test Weights	Standard Weights/masses (0.325,1.0 kg, 2.16 kg, 3.8 kg,5 kg,10Kg,15kg& 21.6 kg.) with mass conformityTraceable certificates.
	Die Material	Tungsten Carbide with dimensional conformity Traceable certificate
	Die Dimension	Confirming to ASTM 1238 & ISO 1133
	Cutter	Automatic extrudate cutting device.
	Special Features	· Die Swell Measuring Device to measure extrudate diameter, complete with laser detection system
		· High-Precision digital Encoder for automatic measure of MVR
		· Auto weight loader
		· Lifter for automatic and accurate test mass application
		· Integrated Load system for material compacting,purging and final expulsion with a controlled and programmable force
		· High-temperature accuracy and stability
		· On-board interface for method setting and visualization of results
		· Fully automatic mass selector system to carry out tests with single weight or multiple weights in increasing, decreasing or free sequence.
		· Built in timer with buzzer alarm.
		· Temperature accuracy and stability according to ISO 1133 on whole working range
		· Quick release die slide
		· Corrosion-resistant material for barrel, piston, and dies
	Software	• Software for set up of parameters,automatic control of operations like automatic weight lifter, storage of various test parameters & measurement points & Standard functions like auto calibration , calculation& data collection.
		· PC control and advanced data analysis.
		· For Graphs and numerical data for the whole test, Basic statistical analysis of data

		<ul style="list-style-type: none"> Shear Rate, shear stress, and viscosity (flow curve from multi-weight tests),MVR, Intrinsic Viscosity (I.V.) estimated through correlation with MFR data/MVR Data.
		<ul style="list-style-type: none"> Operating console with LCD display
	Others Accessories	<p>The equipment to be supplied with:</p> <ul style="list-style-type: none"> Standard Tool Kit containing cleaning tool for barrel and die, compression tool, die removing tool, die plug, cut-off knife, laboratory funnel or spoon for sample loading into barrel, levelling device, die retaining plate, tilt mirror, cleaning patches & cleaning cream. Should be supplied with suitable external thermometers suitable to calibrate the barrel temperature at 190°C & 230 °C with traceable calibration certificate (188°C to 192 °C with readability 0.1 °C) & (228°C to 232 °C with readability 0.1 °C). Go/No - Go gauge for capillary diameter complete with dimensional conformity traceable certificate – 01 No. each 02 Nos of extra dies including 01 No half die . PC of suitable configuration with necessary software
	Standard Reference Materials	Standard reference materials of low MFI with NIST traceable certificate as per ASTM 1238 requirements to be supplied. .
	Other Mandatory Items	<p>While supplying the Machines, the supplier should also provide the following items apart from above:</p> <ul style="list-style-type: none"> Hard copies of Operational & Service Manual- 01 set Safety gloves & goggles required for day to day activities during operation of Machine-01 set Necessary Hoses & Nipples & pressure controller sytem required to connect the air line-01 set The Machines should come with all other essential accessories & spares (as per ASTM & ISO standards) required for installation, commissioning & operation.

6

BULK DENSITY APPARATUS

<u>Technical Specification</u>		
Make		
Model		
S. No	Items	Specification
NAME		BULK DENSITY APPARATUS
	QUANTITY	01 Set
	TYPES OF TESTS TO BE PERFORMED	Measure the bulk density property of powder and pellets.

APPLICABLE STANDARD		ASTM D 1895 method A and B
TECHNICAL SPECIFICATION		
	Measuring cup Dimension	For Model A: Cylindrical cup of 100cm ³ and For Model B: Cylindrical cup of 400 cm ³ with other dimensions as per ASTM D 1895
	Funnel Dimension	9.5 mm dia and 25.4 mm dia opening at bottom for Method A & Method B respectively with other dimensions confirming to ASTM D 1895
	Drop Height	Fixed Drop Height
	Electrical Supply	230 V AC ± 10%, 50/60 Hz
	Calibration	Machine should be supplied with calibration certificates pertaining to Dimension of Cup & Funnel as per ASTM D 1895.
	Other Mandatory Items	<p>While supplying the Machines, the supplier should also provide the following items apart from above:</p> <ul style="list-style-type: none"> • Hard copies of Operational & Service Manual- 01 Set . <p>NABL Calibration certificate for the applicable parts of equipment like heights and cup dimensions.</p> <ul style="list-style-type: none"> • The Machines should come with all other essential accessories & spares (as per ASTM) required for installation, commissioning & Demonstration.

7

BURST TESTER

Technical Specification		
Make		
Model		
S. No	Items	Specification
QUANTITY		1
TYPES OF TESTS TO BE PERFORMED		For testing burst resistance for fabric, Sheet , laminations & corrugated box
APPLICABLE STANDARD		IS 1966 ,IS 15907 & ASTM D-3786
Technical Specification		
1	Pressure Range	Upto 60bars
2	Least Count	0.01bar.
3	Main Features	Digital pressure indicator LCD based
		Firmly secure clamping.
		Long lasting diaphragm with proper standard.
5	Power Requirement	230V,50Hz

6	Other Mandatory Items	<p>While supplying the Machines, the supplier should also provide the following items apart from above:</p> <ul style="list-style-type: none"> • Hard copies of Operational & Service Manual-01 Set . • NABL Traceable Calibration certificate for equipment • Machine should come with all other essential accessories & spares required for installation, commissioning & Operation.
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8

CO-EFFICIENT OF FRICTION TESTER

<u>Technical Specification</u>		
Make		
Model		
S. No	Items	Specification
1	Purpose	To determine both static and kinetic friction, and to measure the block and reblock force.
2	Principle/ Definition	Coefficient of friction (COF) is the maximum value of the frictional force divided by the normal force.
3	Reference Standard	ASTM D1894-14, ISO 8295: 2004
4	Load Cell Capacity	5 kg to be supplied with 1 Kg load cell.
5	Direct display with main features	<ul style="list-style-type: none"> • Digital Display for Static and kinetic friction values , precise control, graph (Load vs Displacement) & data acquisition, • Advanced dedicated microprocessor control • Analysis of the results and reporting. • Digital Temperature display • LCD Display • RS 232 & Ethernet connection
6	Speed	Fully microprocessor control variable speed upto 1800 mm/min
7	Accuracy	± 1% within entire range or better
8	Resolution	3 decimal places
9	Weight of sled	200 gramswith Variable sled weight option
10	Power	220 -240Volts, 50Hz, single phase.
11	Software	Calibration tools with in-house calibration
12	Other Mandatory Items	<p>While supplying the Machines, the supplier should also provide the following items apart from above:</p> <ul style="list-style-type: none"> • Thermal Printer-01 No • Printer Paper Roll- Adequate • Hard copies of Operational & Service Manual- 01 Set . • Basic Tool Kit -01 Set • Traceable Calibration Certificates for Sled & Load cells-01 set.

		<p>The Machines should also come with all other essential accessories & spares required for installation, commissioning & Operation.</p>
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9

Colour Index (Spectrophotometer)

Technical Specification		
Make		
Model		
S. No	Items	Specification
1	Measurement Principle	Dual beam spectrophotometer.
2	APPLICABLE STANDARD	ASTM D1925, ASTM E313, ASTM D2244, ASTM E308, ASTM E1164, DIN 5033, JIS Z 8722, ISO 7724/1, CIE 15: 2004
3	Light Source	Pulsed Xenon lamp filtered to approximate D65
4	Viewing Aperture	Large area view : 1.75 in. illuminated, 50 mm measured
		Small area view : 1.75in, 1.00in, 0.50in, 0.25in & 0.13 in illuminated
		2in., 1.20in, 0.70in, 0.40in, 0.20in, measured
5	Lens switching for LAV/SAV	Automatic
6	Spectral Range	400-700 nm
7	Resolution	<3nm
8	Effective Band width	10 nm equivalent triangular
9	Photometric range	0 - 150%
10	Photometric Resolution	0.003%
11	Light Source	Pulsed Xenon lamp, Filtered to approximate D65 daylight
12	Lamp life	1 billion flashes or better
13	Automatic UV Control	420nm cutoff filter for UV Control & UV Exclusion
14	Measurement Time	< 3 seconds; (except 3mm area < 10sec.)
15	Calorimetric repeatability	For white tile: $\Delta E^* < 0.09$ for 44mm (1.75 inch)
		For Blue denim tile: $\Delta E^* < 0.07$ for 44mm (1.75 inch)
16	Inter instrument agreement	$\Delta E^* < 0.15$ (Avg) for 44mm (1.75 in.)
		$\Delta E^* < 0.36$ (Max.) for 44 mm (1.75 in.) CIE Lab (max.)
17	Equipment to be supplied with all essential Accessories such as:	Calibrated white UV Fluorescent Standard with certificate of calibration -01 no
		Sample Cup Opaque Cover-01 no
		Glass Sample Cup (2.5in)-04 nos
		Port insert, 2.5in Glass sample cup holder-01 no
		Sample Clamp Assembly-01 no
		Other parts like cable, adapter, power cord etc
		Black Calibration light Trap
		Green Check Tile
18	Color matching software to measure: L, a, b, Δxyz	Suitable advanced software & manual
		Suitable advanced software inbuilt with instrument
		While supplying the Machine, the supplier should also provide the following items apart from above:

19	Other Mandatory Accessories:	<ul style="list-style-type: none"> Branded PC of best configuration with necessary software including software for colour matching & colour printer suitable for the instrument operation.
		<ul style="list-style-type: none"> Basic tool Kit-01 set
		<ul style="list-style-type: none"> Hard copies of Operational & Service Manual- 01 set
		<ul style="list-style-type: none"> The Machines should come with all other essential accessories & spares (as per ASTM & ISO standards) required for installation, commissioning & operation.

10

CONTOUR CUTTER

<u>Technical Specification</u>		
Make		
Model		
S. No	Items	Specification
	Quantity	1
	Purpose	For production of test specimen samples of thermoplastic (rigid) materials to be used for Testing.
	Standard specimens to be prepared	ASTM D648 rectangular, ASTM 638, ASTM D695-17, ASTM D790-17, ASTM D5930-17, ASTM D256-10, ASTM D6110-10, ASTM D257-14, ASTM D1003-13, ASTM D3039-17, ISO 294-1, 294-2, IS -14151 Part-1 Type-2 dumbbell, For Tensile specimen - ISO 527-2-2012, Parts-4 and 5, IS 12701 (Tensile and Flexural specimen), IS 4984-2016, IS 8543 (Part-4 sec 1) dumbbell, IS 13360 (Part-5 sec 6) rectangular
TECHNICAL SPECIFICATION FOR CONTOUR CUTTER		
	Table size (LXD)	330 x 375 mm or equivalent
	XYZ axes stroke	310x220x160 mm or equivalent.
	XYZ axes movement resolution	3 µm or equivalent
	XYZ axes positioning repeatability	0.02 mm or equivalent
	Fraise head holder movement	Through a step motor and 12 mm dia. ball screw without backlash, 5 mm pitch.
	Fraise head holder movement speed (mm/sec)	up to 100, recommended work speed: 15 to 20 or equivalent
	Fraise rotation speed (rpm)	8000 to 24000 set manually according to the material type
	Shield opening safety lock	Timed door lock release.
	Emergency stop	Red panic button (Mushroom type)
	Electrical Service	
	Voltage (V)	230
	Installed power (W)	850 or equivalent
	PC connection	series RS232

	With safety shield closed (L X W XH)	600 x 800 x 700mm or equivalent
	With safety shield open (L X W X H)	600x850 x900 mm or equivalent
	Other special features	•Vacuum system for dust collection to be included
		•Set of cutter for various type of materials and for different type of finish
		•Speed control
		•Dimension control
	Personal Computer (PC)	A Personal Computer (PC) having latest configuration. All software shall be loaded in the hard disk with appropriate partitions. All original CDs/DVDs must be provided. The scope of supply also includes a good (reputedmake, please give the details).
	Other Mandatory Items	While supplying the Machines, the supplier should also provide the following items apart from above:
		• Hard copies of Operational& Service Manual-01 set.
		• All templates as per standards mentioned above with traceable calibration certificates
		• Machine should come with all other essential accessories & spares required for installation, commissioning &operation
		• Onsite Training to be provided at Installation

11

DEEP FREEZER (Longer Size)

<u>Technical Specification</u>		
Make		
Model		
S. No	Items	Specification
1	Capacity(L)	550 or above
2	Cabinet Type	Horizontal to accommodate 3mtr length of Pipe sample of Dia 400mm
3	Climate Class	Any climatic conditions
4	Cooling Type	Natural convection
5	Cooling system	Two Compressor cascade system or equivalent
6	Cooling Performance	(-)5°C or better
7	Refrigerant	CFC-Free or equivalent
8	Noise level	50 dBa or better
9	Temperature Controller	Microprocessor
10	Display	LED
11	Power	230 v, 50 Hz
		Interior: high quality stainless steel

12	Material of construction	Exterior: Powder coated steel
		Shelf: minimum 03nos.
		Insulation: Panel Foam or better
13	Functions	High/Low Temperature alarm
		Remote alarm
		High Ambient Temperature alarm
		Hot condenser alarm
		Power failure alarm
		Sensor failure alarm
		Low Battery alarm
14	Accessories	High/Low Voltage alarm
		Caster
		Testing Hole
		Remote alarm contact
15	Other Mandatory Items	Temperature Recorder
		While supplying the Machines, the supplier should also provide the following items apart from above:
		<ul style="list-style-type: none"> • Hard copies of Operational & Service Manual- 01 Set . • Machine should come with all other essential accessories & spares required for installation, commissioning& Operation.

12

DEEP FREEZER (LOW TEMP.CABINET)

<u>Technical Specification</u>		
Make		
Model		
S. No	Items	Specification
1	Make	Bidder to specify
2	Model	Bidder to specify
3	Capacity(L)	550 or above
4	Cabinet Type	Upright
5	Climate Class	Any climatic conditions
6	Cooling Type	Natural convection
7	Cooling system	Two Compressor cascade system or equivalent
8	Cooling Performance	-85°C or better
9	Refrigerant	CFC-Free or equivalent
10	Noise level	50 dBa or better
11	Temperature Controller	Microprocessor
12	Display	LED
13	Power	230 v, 50 Hz
14	Material of construction	Interior: high quality stainless steel
		Exterior: Powder coated steel
		Shelf: minimum 03nos.
		Insulation: Panel Foam or better
15	Functions	High/Low Temperature alarm
		Remote alarm
		High Ambient Temperature alarm
		Hot condenser alarm

15	Functions	Power failure alarm
		Sensor failure alarm
		Low Battery alarm
		High/Low Voltage alarm
16	Accessories	Caster
		Testing Hole
		USB Interface
		CO2 Backup system
		Remote alarm contact
17	Other Mandatory Items	Temperature Recorder
		While supplying the Machines, the supplier should also provide the following items apart from above:
		<ul style="list-style-type: none"> • Hard copies of Operational & Service Manual- 01 Set .
		<ul style="list-style-type: none"> • Machine should come with all other essential accessories & spares required for installation, commissioning& Operation. • One site training to be provided.

13

DIGITAL WEIGHING BALANCE WITH DENSITY KIT

Technical Specification		
Make		
Model		
S. No	Items	Specification
1	Capacity	220 g
2	Accuracy	0.1 mg
3	Display	LCD/VFD
4	Weighing pan diameter	80 - 100 mm
5	Repeatability	0.1 mg
6	Power Supply	230 V AC, 50 Hz
7	Pan Size	8 to 10 cm
8	Weighing units	mg, g
9	Stabilization time	2 sec
10	Stability Filters	Three filters to match weighing environment
11	Output	RS 232 Interfaced
12	Accessories	Density measurement kit with thermometer(Range: Upto 30 Deg,L.C: 0.1 DegC) and sinker of Concave & convex type Calibration Weights Sets consisting 0.1gm,2mg,5mg,100mg,1gm,5gm,10gm,50 gm,100gm,200gm weights
Calibration certificate traceable to NIST should be provided for weighing balance and standard weights		
	Other Mandatory Items	While supplying the Machines, the supplier should also provide the following items apart from above:

13	<ul style="list-style-type: none"> • Hard copies of Operational & Service Manual- 01 Set .
	<ul style="list-style-type: none"> • Required traceable to NIST calibration certificate for the Weight Sets and for the machine
	<ul style="list-style-type: none"> • Machine should come with all other essential accessories & spares required for installation, commissioning& Operation.

14

DROP TESTER

Technical Specification		
Make		
Model		
S. No	Items	Specification
QUANTITY		1
TYPES OF TESTS TO BE PERFORMED		For drop resistance of Containers used packing of drinking water of sizes upto 20Ltrs capacities
1	Applicable Standard	IS 2798 Clause 8 & IS 15410
2	Height Range	Adustable upto 1.2 mtr
3	Features	The equipment should comply to the following features:
		Permits accurate prepositioning of the containers of sizes 300ml to 20 ltrs capacities .
		Permits accurate and convinient control of the height of drop(i.e 0.5mtr,1.0mtr & 1.2 mtrs
		Provided dropping surface made of solid rigid flat horizontal surface of steel to absob all shock without deflection
		Platform should be fenced to avoid water leakage outside incase of test ciontainer failure
4	Other Mandatory Items	While supplying the Machines, the supplier should also provide the following items apart from above: <ul style="list-style-type: none"> • Hard copies of Operational & Service Manual- 01 Set . • NABL/NIST Tracebale Calibration certificate for the applicable parts of equipment like heights. • Different attachements required for testing of different capacity containers upto 20Ltr capacity. • Machine should come with all other essential accessories & spares required for installation, commissioning& Operation.

15

Electrical Heated Press

<u>Technical Specification</u>		
Make		
Model		
S. No	Items	Specification
QUANTITY		1
TYPES OF TESTS TO BE PERFORMED		For preparation of Sheet for PE materials by compression press
APPLICABLE STANDARD		IS 7328
Technical Specification		
1	Temperature range:	Max. up to 300°C.
2	Least count	0.5°C or better
3	Pressure Range	Max 200Kg/Cm ²
4	Least Count	01Kg/Cm ² or better
5	Features	Digital PID based temperature controller
		Digital Timer & pressure indicator
		Construction of bath is outside MS with powder coating and inside SS
		ISI or CE mark electrical panel and components.
6	Accessories	Highly Polished chrome Plate-04 nos
		Suitable Spacer frame of 100x 120mm-04 sets
7	Power Requirement	230V,50Hz
8	Other Mandatory Items	While supplying the Machines, the supplier should also provide the following items apart from above: <ul style="list-style-type: none"> • Hard copies of Operational & Service Manual-01 Set . • NABL Traceable Calibration certificate for equipment for pressure ,Temperature & timer • Machine should come with all other essential accessories & spares required for installation, commissioning& Operation.

16

ELMENDORF TEAR TESTER

<u>Technical Specification</u>		
Make		
Model		
S. No	Items	Specification
	Model	Bidder to specify the Latest models meeting standard Test Methods & Technical specifications.
	Reference Standard	ASTM D1922
		64000 mN and equivalent
	Maximum Capacity	Should achieve different capacity by interchangeable pendulum or augmented weights

	Pendulum Ranges	200g, 400g , 800g, 1600g, 3200 g, 6400 g
	Accuracy of the mean force measurement	±1% of the indicated value .
	Measurement and display Units	mN
	Selectable Units	Milli newtons (mN), Grams-force (gf), Pounds-force (lbf)
	Accessories	• Computer-assisted calibration software + set of weights and accessories
		• Specimen preparation/cutting tools/Standard punch as per standard
		• Standard Pneumatic grips
		• Compressed air system for pneumatic Gripping
		• PC with operating software & Printer
		• Other Standard operating tools and accessories as per standard.
	Other Mandatory Items	While supplying the Machines, the supplier should also provide the following items apart from above:
		• Hard copies of Operational & Service Manual- 01 set .
		• Calibration Certificate with traceability for required parameters.
		• Machine should come with all other essential accessories & spares required for installation, commissioning& Operation.
		• Suitable Printer for Printing of test data after each test
		Onsite Training by application engineer
	Special Features	• Automatic pendulum reset
		• Data Storage and editing of up to 200 readings
		• Automatic specimen notching facility
		• Safety Cover
		• Standard Automatic weights recognition
		• RS 232 C output

17

ENVIRONMENTAL CHAMBER

Technical Specification		
Make		
Model		
S. No	Items	Specification
QUANTITY		1
TYPES OF TESTS TO BE PERFORMED		For Conditioning of Plastic Products ,and allied products & Ageing test
APPLICABLE STANDARD		NA
Technical Specification		
1	Temperature Range & Accuracy	(-)70°C to (+)150°C,±0.1°C

2	Humidity Range & Accuracy	5% to 98%R.H , $\pm 1\%$
4	Heating element	Silicon carbide (SiC) / Molybdenum Silicide (MoSi ₂)
5	Heating rate	Fast heating rate and the maximum temperature should be attained as a ramp function within 1 hour Assured uniform heating inside the chamber
6	Furnace	Fire Bricks Insulated Muffle Furnace. Door opening on front side. / Powder coated outer body
7	Features	#USB download function, with RS232 interface, #Vacuum glass observation window, #Direct observation of the function more effectively #Software upgrade function #Defrost cycle (800 cycle defrost time, defrosting guarantee within 2 hours each time
8	Inner Chamber Size W*H*D(cm)	100 X100 X100 or better
9	External Chamber Size W*H*D(cm)	To be specified by Bidder
10	Power Requirement	230V, 50Hz
11	Accessories	Mesh Tray -03Nos, Water Container of required capacity . One set of Electrical spares
12	Other Mandatory Items	While supplying the Machines, the supplier should also provide the following items apart from above: • Hard copies of Operational & Service Manual-01 Set . • NABL Traceable Calibration certificate for the applicable parts of equipment like Temp.& humidity for whole ranges . • Machine should come with all other essential accessories & spares required for installation, commissioning & Operation.

18

GLOSS METER

Technical Specification		
Make		
Model		
S. No	Items	Specification
1	Purpose	For Precision Gloss Evaluation of Plastics
2	Reference Standard	ASTM D523, ASTM D 2457, ISO 2813, ISO-7668
3	Angle Heads	20°, 60° and 85°

4	Range (Gloss Unit)	0-2000 GU (20°) 0-1000 GU (60°) 0-199 GU (85°)
5	Accuracy	± 1 GU
6	Resolution	0.1 GU
7	Power supply	230V & 50Hz, & Rechargeable Batteries
9	Calibration	Automatic, by means of built –in microprocessor
10	Measurement	Individual measurement and statistical evaluation
11	Memory	999 Measurement values with date & time.
12	Digital Display	Alphanumeric LCD
14	Other Mandatory Items	While supplying the Machines, the supplier should also provide the following items apart from above:
		· Hard copies of Operational & Service Manual- 01 Set .
		Calibration holder and standard tiles for 20o , 45°, 60° and 85° angles should be provided along with NIST traceable certificate
		· Machine should come with all other essential accessories & spares required for installation, commissioning& Operation.

19

Hot Air Oven(forced air convection oven)

<u>Technical Specification</u>		
Make		
Model		
S. No	Items	Specification
QUANTITY		1No
TYPES OF TESTS TO BE PERFORMED		For ageing test at different temprature & various conditioning puposes
APPLICABLE STANDARD		Various National & International Standards
Technical Specification		
1	Capacity	250 ltrs
2	Temperature range	5°C above ambient to 250°C
3	Temperature Accuracy	0.1°C
4	Temperature Uniformity	(+/-) 0.5°C
6	Inner Chamber Size W*H*D(cm)	To be specified by bidder as per Volume given
	Features	Digital PID based temperature controller with LED display for temperature
		304 stainless steel interoir material with MS powder coated exterior
		Ventilation of gases
		Precise and even heat distribution
		03 SS Shelves (removable)

7		ISI or CE mark electrical panel and components.
		Noise-less fan with Forced air circulation.
		Removable stainless steel shelves
		Imported heating element
		Over temperature and over current protection
		Double walled construction
		Stainless steel outer cabinet
		PT -100 Sensor
8	Accessories	03 nos of SS Mesh Tray extra
9	Power Requirement	230V,50Hz
10	Other Mandatory Items	<p>While supplying the Machines, the supplier should also provide the following items apart from above:</p> <ul style="list-style-type: none"> • Hard copies of Operational & Service Manual-01 Set . • NABL Traceable Calibration certificate for equipment • Machine should come with all other essential accessories & spares required for installation, commissioning& Operation.

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Hot Air Oven(forced air convection oven)

<u>Technical Specification</u>		
Make		
Model		
S. No	Items	Specification
QUANTITY		2Nos
TYPES OF TESTS TO BE PERFORMED		For ageing test at different temprature & various conditioning puposes
APPLICABLE STANDARD		Various National & International Standards
Technical Specification		
1	Capacity	300 ltrs
2	Temperature range:	5°C above ambient to 400°C maximum
3	Temperature Accuracy	(+/-) 1°C
4	Temperature Uniformity	(+/-) 1°C
6	Inner Chamber Size W*H*D(cm)	To be specified by bidder as per Volume given
7	Features	Digital PID based temperature controller with LED display for temperature
		304 stainless steel interoir material with MS powder coated exterior
		Ventilation of gases
		Precise and even heat distribution
		03 SS Shelves (removable)
		ISI or CE mark electrical panel and components.

		Noise-less fan with Forced air circulation.
		Removable stainless steel shelves
		Imported heating element
		Over temperature and over current protection
		Double walled construction
		Stainless steel outer cabinet
		PT -100 Sensor
8	Accessories	03 nos of SS Mesh Tray extra
9	Power Requirement	230V,50Hz
10	Other Mandatory Items	<p>While supplying the Machines, the supplier should also provide the following items apart from above:</p> <ul style="list-style-type: none"> • Hard copies of Operational & Service Manual-01 Set . • NABL Traceable Calibration certificate for equipment • Machine should come with all other essential accessories & spares required for installation, commissioning& Operation.