KENDSTAR®

About KendStar

At **KendStar**, we're on a mission to make **pure and safe drinking water** accessible to every corner of India. As a rising water purifier startup, we specialize in designing and manufacturing advanced **RO systems, Mineral Water Plants, ETP, STP,** and **DM Plants** — tailored for both **industrial** and **home use**.

With a deep focus on **quality, affordability, and innovation**, KendStar is committed to bringing modern water treatment technology to places where it's needed most — especially **remote and rural areas** facing water contamination issues.

🔧 **Affordable Solutions** | 🌿 **Eco-Friendly Technology** | 📍 **Pan-India Service**

CONTACT US

KENDSTAR INDIA

91-6296-85-5598 91-6296-85-5598

kendstar1995@gmail.com www.kendstar.com

Shyamsundarpur, Daspur, West Bengal, Pin - 721211, INDIA

Here’s a comprehensive comparison of **Reverse Osmosis (RO) Machine** specifications across **Automatic** and **Manual (Semi-Automatic)** models, typically used for water purification in industrial, commercial, or residential settings:

□ Automatic RO Machine Specifications

These machines are fully automated with minimal human intervention, controlled via PLC or digital systems.

Feature	Specification
Operation	Fully automatic (start, stop, flushing, error handling)
Control System	PLC with HMI / touchscreen control panel
Capacity Range	100 LPH to 100,000+ LPH
Stages	Typically 4–7 stages (Pre-filtration, Carbon, Softener, RO membrane, UV, etc.)
Membrane Type	Thin Film Composite (TFC) – 4” or 8” size, based on capacity
Automation Features	Auto shut-off, auto flushing, TDS controller, automatic pressure adjustment
Monitoring	Online TDS, flow rate, pressure gauges, water quality sensors
Pump Type	High-pressure SS multistage pumps
Frame Material	SS304 / SS316
Power Consumption	1 – 25 kW depending on capacity
Recovery Rate	50% – 75% (depends on source water quality)
Application	Industries, bottling plants, large institutions
Labor Requirement	Low (1 person to monitor)
Cost	Higher upfront cost

□ Manual / Semi-Automatic RO Machine Specifications

These systems need manual input or operation for some parts like pump start/stop, flushing, or water quality monitoring.

Feature	Specification

Feature	Specification
Operation	Manual start/stop, manual flushing, periodic checks
Control System	Basic switches, pressure gauges, no PLC
Capacity Range	50 LPH to 5,000 LPH (can go higher but not typical)
Stages	3–5 stages (basic filtration + RO)
Membrane Type	2.5” or 4” TFC membranes
Automation Features	None or basic (manual TDS check, timer flushing)
Monitoring	Analog pressure gauges, manual TDS checks
Pump Type	Standard RO booster or centrifugal pumps
Frame Material	Mild steel powder coated / SS304 (optional)
Power Consumption	0.5 – 5 kW
Recovery Rate	~50% (depends on maintenance)
Application	Small offices, homes, small businesses
Labor Requirement	Medium – operator required for control
Cost	Lower cost

□ Automatic vs Manual RO Machine Comparison

Feature	Automatic RO	Manual/Semi-Auto RO
Ease of Operation	Very high	Medium
Maintenance	Scheduled, automatic alerts	Manual tracking
Water Quality Control	Continuous and precise	Periodic/manual checks
Suitable For	Commercial/industrial plants	Small businesses/homes
Skill Requirement	Low	Moderate
Investment	High	Lower

Blow moulding machines are used to manufacture hollow plastic parts by inflating a heated plastic tube until it takes the shape of a mould cavity. These machines can be categorized based on their level of automation: **automatic** and **semi-automatic**. Below is a comparison of their typical specifications:

□ Automatic Blow Moulding Machine Specifications

These machines run with minimal human intervention, offering high production rates and consistency.

Feature	Specification
Operation	Fully automated – integrated systems for preform loading, heating, blowing, and ejection
Production Speed	High – 1000 to 12,000 bottles/hour (varies by model)
Cavity Options	1 to 12 cavities
Bottle Volume Range	50 ml to 5 liters (can go higher with specialized machines)
Heating System	Infrared heaters with precise temperature control
Control System	PLC with HMI touchscreen interface
Automation	Robotic arm / Conveyor-based systems
Air Consumption	1 – 3 m³/min per cavity (varies)
Power Consumption	15 – 60 kW depending on size and type
Application	Suitable for mass production of PET bottles (e.g., beverages, cosmetics, pharmaceuticals)
Labor Requirement	Low (1 operator for monitoring and quality check)
Cost	Higher initial investment

□ Semi-Automatic Blow Moulding Machine Specifications

These machines require manual intervention for loading preforms and collecting finished products.

Feature	Specification
Operation	Manual preform loading and bottle removal; automatic heating and blowing
Production Speed	Medium – 300 to 1500 bottles/hour
Cavity Options	1 to 2 cavities (sometimes 4)
Bottle Volume Range	100 ml to 20 liters
Heating System	Manual or semi-auto infrared heating
Control System	Basic PLC or manual switches
Automation	Partial – operator handles loading/unloading
Air Consumption	0.8 – 2.5 m³/min
Power Consumption	10 – 30 kW

Feature	Specification
Application	Ideal for small-scale production, customized batches, or startups
Labor Requirement	Higher (1 operator per machine)
Cost	Lower initial investment

✓Key Differences

Feature	Automatic	Semi-Automatic
Automation Level	High	Medium
Labor Requirement	Low	High
Productivity	High	Medium
Cost	High	Lower
Ease of Use	More complex (but user-friendly)	Simpler to learn
Best For	High-volume manufacturing	Low-volume or startup production

Here's a detailed specification breakdown of **Bottle Rinsing, Filling, and Capping Machines** (RFC Machines), which are essential in beverage and liquid packaging industries.

These machines are typically classified as **Automatic** or **Semi-Automatic** and can be tailored for various liquids (water, juice, milk, carbonated drinks, etc.).

□ 1. Automatic Bottle Rinsing, Filling, and Capping Machine Specifications

Feature	Specification
Operation	Fully automated – bottles are rinsed, filled, and capped in one cycle
Control System	PLC with HMI/touchscreen (Siemens, Mitsubishi, etc.)
Production Capacity	1,000 – 24,000 bottles/hour (depending on model and heads)
Bottle Volume	200 ml to 2 liters (customizable)
Bottle Type	PET, Glass, HDPE (as per customization)
Rinsing System	Inverted gripper with water/air jet nozzles (adjustable timing)
Filling System	Gravity / Pressure / Vacuum / Hot filling depending on liquid
Filling Heads	4 to 60 heads
Capping Type	Screw capping / ROPP / Snap fit (interchangeable heads possible)
Capping Heads	1 to 20 heads
Power Requirement	3 – 20 kW (varies with size)
Air Requirement	0.6 – 1.2 m^3/min at 6–8 bar
Structure Material	Stainless Steel SS304 / SS316
Bottle Orientation	Rotary / Linear conveyor system
Automation	Bottle infeed, filling, cap placement, cap pressing – fully auto
Output Conveyor	Automatic bottle outfeed with sensors

Feature	Specification
Safety Features	Emergency stop, interlocks, safety covers, overload protection
Application	Mineral water, carbonated drinks, juices, dairy, oil

---

□ 2. Semi-Automatic Bottle Rinsing, Filling, and Capping Machine Specifications

Feature	Specification
Operation	Operator loads bottles manually for rinsing/filling/capping
Control System	Manual / Basic timers and switches
Production Capacity	300 – 1,200 bottles/hour
Bottle Volume	250 ml to 5 liters
Bottle Type	PET / Glass
Rinsing System	Manual or semi-auto jet with foot/hand activation
Filling System	Gravity / Pneumatic piston filling (based on liquid type)
Filling Heads	1 to 4 heads
Capping Type	Manual screw / pneumatic press / foot-operated
Capping Heads	1 head or manual capper
Power Requirement	0.5 – 2 kW
Structure Material	SS304 frame or mild steel (painted)
Labor Requirement	High – 1–3 operators required
Application	Small bottling plants, pilot plants, rural units

□ Automatic vs Semi-Automatic RFC Machine Comparison

Feature	Automatic	Semi-Automatic
Throughput	High (1000–24,000 BPH)	Low to Medium (300–1200 BPH)
Labor	Low (monitoring only)	High (manual handling)
Consistency	Very High	Operator-dependent
Maintenance	Scheduled with self-diagnostics	Simpler but manual tracking
Footprint	Large	Small to Medium
Cost	High	Low to Moderate
Best For	Large bottling operations	Startups, small businesses

Here are the detailed specifications and descriptions for a **Cap Elevator** and **Cap Orienter**, which are essential components in automatic bottle capping lines. These systems ensure continuous feeding and correct orientation of caps before capping.

□ 1. Cap Elevator – Specification

A **Cap Elevator** is used to **transport caps from a hopper (ground level) to a cap orienter or sorter** at a higher elevation. Ideal for feeding caps into rotary or inline capping machines automatically.

Feature	Specification
Function	Lifts caps from bulk hopper to sorting/orienting unit
Speed	Adjustable (up to 300 caps/min or more depending on cap size)
Cap Type	Plastic screw caps, flip-top caps, press-fit caps (varies with design)
Cap Size	Diameter: 20–70 mm (customizable)
Belt Type	Cleated (PU or PVC) belt with side guides
Capacity	Hopper: 50–200 liters (or more, based on design)
Material	SS304 body with food-grade PU belt
Height	Customizable to match capper height (typically 1.5–2 meters)
Motor Type	Geared motor with speed control (variable frequency drive - VFD)
Sensors	Level sensor to auto-start/stop based on capper demand
Power Requirement	0.5 – 1.5 kW
Noise Level	< 70 dB
Footprint	Compact, mobile design (wheels optional)

□ 2. Cap Orienter – Specification

A **Cap Orienter** ensures that the caps are correctly aligned (open side down, logo forward, etc.) before being delivered to the capping head.

□ Rotary Disc or Centrifugal Orienter (Most Common)

Feature	Specification
Function	Aligns caps using centrifugal force and mechanical guides
Speed	Up to 300 caps/min (higher with custom design)
Cap Compatibility	Round, oval, flip-top, childproof, etc. (custom guides)
Disc Size	400–800 mm diameter
Orientation Accuracy	> 98%
Cap Sorting	By gravity track, air jet, or mechanical rejectors
Material	SS304 and anodized aluminum
Sensors	Jam detection, low cap level, orientation sensor
Integration	Mounts above the capping turret or on a separate stand
Power	0.5 – 1.5 kW
Control	Manual or PLC integrated
Special Features	Can include anti-static units for high-speed lines

□ Other Types

- **Vibratory Bowl Orienters** – used for small caps in pharma or cosmetics
- **Air Sorting Channels** – for lightweight, small-diameter caps

---

□ Cap Elevator + Orienter System: Combined Workflow

1. **Cap Elevator** feeds loose caps from ground-level hopper.
2. **Caps travel up via cleated belt.**
3. **Caps are dropped into the orienter.**
4. **Orienter aligns caps correctly and feeds them into the cap chute.**
5. **Caps are delivered to the capping machine chute in the correct position.**

✓Optional Features

- Dust cover or acrylic enclosure
- Hopper vibration for smooth feeding
- Auto cap level sensor and refill alarm
- Multiple cap size compatibility (with tool-less changeover)

□ Applications

- Beverages (PET bottle screw caps)
- Pharmaceuticals (CRC – child-resistant caps)
- Personal care (flip-top and snap caps)

- Food & dairy (wide-mouth closures)

Here are detailed **belt conveyor specifications**, commonly used in bottling, packaging, pharmaceutical, food, and manufacturing lines for product transfer between machines or stations.

□ Belt Conveyor – General Specifications

Feature	Specification
Function	Transfers bottles, containers, boxes, pouches, etc. along a processing/packaging line
Belt Material	Food-grade PVC, PU, rubber, modular plastic (depending on application)
Belt Width	100 mm to 1000 mm (most common: 200mm–400mm for bottles)
Length	1 meter to 30+ meters (customized per layout)
Speed	Adjustable via VFD; typically 0.5 – 20 m/min
Load Capacity	20 – 150 kg/m (depends on frame, belt, and motor)
Drive System	Geared motor (center or end drive)
Motor Power	0.25 kW – 2.0 kW (depending on load & speed)
Speed Control	Variable Frequency Drive (VFD) or manual adjustment
Frame Material	SS304 (food/pharma) or powder-coated MS (general use)
Legs/Support	Adjustable height (750–1000 mm typically), with castor wheels or floor mounts
Conveyor Height	Adjustable or fixed as per machine integration
Side Guides	Adjustable SS/PVC guides to hold bottles/boxes in position
Belt Tensioning	Manual or screw-type tensioner
Belt Tracking	Manual tracking roller or automatic system for long conveyors
Noise Level	< 70 dB (low-noise motors preferred)

□ Optional Features

Feature	Description
Sensors	Product detection, jam sensors, count sensors

Feature	Description
Stopper/Indexers	Pneumatic or mechanical stoppers for synchronized filling/labeling
Curved Conveyor	45°, 90°, or 180° curved conveyors for space optimization
Cleated Belts	For inclined transport or item separation
Modular Belts	For washdown zones or high-temperature products
Anti-static Belts	For electronics or powder products
Bottle Transfer Plates	Smooth transfer from one conveyor to another

---

✅ Common Applications

Industry	Use
Beverages	Transfer PET/glass bottles between rinsing, filling, labeling
Pharmaceutical	Tablet bottle movement, blister pack handling
Cosmetics	Moving jars, bottles, pouches through filling & capping
Food	Conveyor for biscuits, dairy, snacks, trays
Packaging	Box/carton transfer, post-labeling sorting

□ Sample Specification (Standard Conveyor for Bottling Line)

- **Belt Type**: Food-grade PVC, 3 mm thick
- **Width**: 300 mm
- **Length**: 6 meters
- **Speed**: 12 m/min, adjustable
- **Motor**: 0.5 HP, 3-phase, with VFD
- **Structure**: SS304 frame with side guards and adjustable height
- **Application**: Bottle transfer from capper to labeler

Here is a detailed specification and comparison of **Batch/Date Coding Machines** – specifically **Inkjet** and **Laser** coders – widely used for printing manufacturing dates, expiry dates, batch numbers, QR codes, and barcodes on products or packaging materials.

□ 1. Inkjet Batch/Date Coding Machine Specifications

□ Continuous Inkjet (CIJ) (Most common for FMCG, bottles, etc.)

Feature	Specification
Technology	Non-contact continuous inkjet
Printing Speed	Up to 300 m/min (depends on model and content)
Print Content	Date/time, batch number, alphanumeric codes, logos, barcodes
Characters per Line	Typically 1–5 lines
Ink Type	Solvent-based or water-based inks (black, white, UV, food-grade)
Ink Colors	Black, white, red, yellow, blue, UV-visible
Substrates	PET, glass, metal, foil, HDPE, cartons
Font Sizes	0.8 mm to 20 mm
Control Interface	Touchscreen (7"–10"), some with keyboard or USB input
Connectivity	USB, Ethernet, RS232
Power Supply	100–240V AC, 50/60 Hz
Environment	IP55 or IP65 for dusty/wet conditions
Maintenance	Requires regular cleaning/flushing; consumables needed (ink, solvent)
Popular Brands	Videojet, Domino, Linx, KGK, Hitachi, Markem-Imaje

---

□ Thermal Inkjet (TIJ) (Good for cartons/labels)

Feature	Specification
Print Technology	Drop-on-demand (cartridge-based)
Resolution	Up to 600 dpi
Print Height	Up to 12.7 mm per head
Inks	Fast-dry inks, water/solvent/UV based
Application	Labels, cartons, pouches, paperboard, plastics

□ 2. Laser Batch/Date Coding Machine Specifications

Feature	Specification
Technology	CO_2 / Fiber / UV Laser (depending on material)
Marking Speed	Up to 900 characters/sec
Print Resolution	300 – 600 dpi
Content	Batch, MRP, logos, expiry, barcodes, QR codes
Marking Area	100x100 mm to 300x300 mm (depends on lens)
Materials Supported	PET, glass, paperboard, aluminum, metal, flexible films
Laser Power	10W to 60W typical (higher for metal)
Cooling	Air or water-cooled
Lifespan	20,000 – 100,000 hours
Interface	Touchscreen HMI, USB/Ethernet
Environmental Protection	IP54 to IP65 for industrial settings
Safety	Class I or IV (shielding required for high-power models)
Maintenance	Minimal – no ink/solvent required
Popular Brands	Domino, Videojet, Telesis, Macsa, REA JET, KGK

□ Inkjet vs Laser Coding: Quick Comparison

Feature	Inkjet	Laser
Initial Cost	Low to Medium	High
Running Cost	High (consumables)	Very Low
Maintenance	Frequent (cleaning, ink refilling)	Minimal
Print Durability	Moderate (can fade/smudge)	High (permanent)
Speed	Very High (CIJ)	High
Substrates	All (depends on ink type)	Needs correct laser type for each material
Environmental Impact	Uses chemicals (solvent)	No consumables (eco-friendlier)
Best For	Bottled water, food pouches, flexible packaging	Pharma, beverages, cosmetics, high-end packaging

---

✅Typical Applications

Industry	Common Choice
Bottled Water / Beverages	CIJ Inkjet or CO_2 Laser
Food Packaging (pouches, cartons)	TIJ or CIJ
Pharmaceuticals	UV Laser or TIJ
Metals / Hard Plastics	Fiber Laser
Cosmetics / Premium Branding	Laser (permanent, clear)

Here’s a comprehensive overview of **Labeling Machine Specifications**, covering the main types used in industrial packaging: **Self-Adhesive (Sticker) Labeling**, **Shrink Sleeve Labeling**, and **Wet Glue Labeling** systems.

□ 1. Self-Adhesive Labeling Machine (Sticker Labeler)

Used for applying pressure-sensitive labels with adhesive backing (e.g., paper or film labels).

Feature	Specification
Label Type	Self-adhesive (sticker) – roll-fed
Machine Type	Front/back, top/bottom, wrap-around, dual-side
Labeling Speed	30 – 300 bottles/min (depending on size and model)
Accuracy	±1 mm
Label Size	Width: 10–150 mm; Length: 10–300 mm (adjustable)
Bottle Size	Diameter: 30–120 mm; Height: up to 300 mm
Container Type	PET, HDPE, glass, metal – round, flat, oval bottles
Sensors	Photoelectric for label gap and product detection
Control System	PLC with HMI touchscreen (Siemens, Delta, etc.)
Drive System	Stepper or servo motor (servo is more accurate)
Conveyor Speed	Adjustable (0–20 m/min typical)
Material Construction	SS304 stainless steel
Power Requirement	1 – 2.5 kW
Integration	Can be inline with filling, capping, and coding machines
Popular Brands	Siddhivinayak, Maharshi, Pack Leader, Label-Aire, Ketan

---

□ 2. Shrink Sleeve Labeling Machine

Used to apply heat-shrinkable plastic sleeves (usually PVC, PET-G) over bottles or containers.

Feature	Specification
Label Type	Shrink sleeve (full body or partial)
Label Material	PVC, PET-G, OPS
Label Thickness	30 – 70 microns
Labeling Speed	100 – 400 bottles/min
Bottle Size	Diameter: 28–125 mm; Height: up to 350 mm
Cutting System	Rotary or servo-driven blade
Sleeve Application	Vertical drop or mandrel system
Shrinking System	Electric or steam tunnel (steam preferred for uniformity)
Control System	PLC with touchscreen
Material Construction	SS304
Power Requirement	2 – 6 kW (shrink tunnel needs additional power)
Steam Pressure *(if steam tunnel)*	3–5 bar
Popular Brands	Accutek, SleeveTech, Devray, Multipack, ShrinkTech

---

□ 3. Wet Glue Labeling Machine

Used for paper labels applied with water-soluble glue, often in glass bottle applications (e.g., beer, chemicals).

Feature	Specification
Label Type	Paper labels from a stack
Adhesive Type	Cold glue (water-based)
Labeling Speed	30 – 200 bottles/min
Label Size	Customizable based on product
Container Type	Round bottles (glass preferred)
Accuracy	±1–2 mm
Glue System	Rotary drum with glue roller
Material Construction	SS304 or painted MS
Power Requirement	0.5 – 2 kW
Cleaning	Requires regular cleaning of glue rollers and trays
Popular Brands	B & B, Hilden, Meena Pharma, Siddhivinayak

□ Labeling Machine Type Comparison

Feature	Self-Adhesive	Shrink Sleeve	Wet Glue
Label Type	Paper/film stickers	Plastic sleeves	Paper labels
Speed	Medium–High	High	Medium
Material Cost	Medium	Higher	Low
Running Cost	Low	Medium–High (steam + sleeves)	Medium
Maintenance	Low	Medium	High (glue cleaning)
Label Aesthetics	Moderate	Premium (360° full-body)	Basic
Best For	Food, pharma, cosmetics	Beverages, juices, detergents	Beer, liquor, old-style glass bottles

---

✓Optional Features

- **Vision inspection** (missing label, skewed label, barcode check)
- **Label reject mechanism**

- **Date/batch coding integration (TIJ or laser)**
- **Servo motors for higher speed & accuracy**
- **Transparent label sensor**
- **Infeed/outfeed conveyors**

Here is a comprehensive comparison and specification breakdown of **Automatic** and **Semi-Automatic Shrink Wrapping Machines**, which are used to wrap products (like bottles, boxes, cans, etc.) with shrink film and heat to seal them tightly.

□ 1. Automatic Shrink Wrapping Machine – Specification

These machines handle **film feeding, sealing, shrinking, and product conveying** automatically.

Feature	Specification
Operation	Fully automatic – product feeding, wrapping, sealing, and shrinking
Speed	10 – 60 packs/min (depends on model and pack size)
Product Types	Bottles, cans, cartons, jars, trays
Film Type	LDPE, Polyolefin, PVC (shrinkable)
Film Thickness	40 – 100 microns
Sealing System	L-bar sealer / sleeve wrapper with hot knife or impulse sealing
Shrink Tunnel	Electric or steam-based with adjustable temp (100–250°C)
Max Product Dimensions	L: up to 800 mm, W: up to 500 mm, H: up to 400 mm (varies)
Conveyor Type	Roller or mesh belt with variable speed drive
Control System	PLC with touchscreen HMI
Power Requirement	8 – 20 kW (depending on tunnel size)
Air Requirement	5 – 6 bar (for pusher or sleeve type)
Material Construction	SS304 or powder-coated MS
Safety Features	Emergency stop, overload protection, auto shutdown
Popular Brands	Multipack, Sevan, Webomatic, Krones, Sidhivinayak

---

□ 2. Semi-Automatic Shrink Wrapping Machine – Specification

Semi-auto systems require manual product loading or film feeding. Ideal for **low to medium volume** production.

Feature	Specification
Operation	Manual loading → automatic/semi-auto sealing and shrinking
Speed	4 – 12 packs/min
Product Types	Bottles, boxes, trays, cans
Film Type	LDPE, Polyolefin, PVC
Film Thickness	40 – 80 microns

Feature	Specification
Sealing System	Manual or pneumatic L-bar/sleeve sealer
Shrink Tunnel	Electric heating chamber, 100–250°C
Max Product Dimensions	L: 500 mm, W: 400 mm, H: 250 mm (typical)
Conveyor Type	Manual or semi-auto with basic drive
Control System	Timers, basic switches, temperature controller
Power Requirement	3 – 8 kW
Material Construction	MS frame or SS304 for hygiene areas
Labor Required	1–2 operators
Popular Brands	Gempac, Akanksha, Packtech, Allpack Engineers

□ Automatic vs Semi-Automatic Shrink Wrapping

Feature	Automatic	Semi-Automatic
Speed	High (10–60 ppm)	Low to Medium (4–12 ppm)
Labor Requirement	Minimal (1 monitor)	Medium (1–2 operators)
Precision	High	Operator dependent
Film Wastage	Low	Medium
Cost	Higher investment	Lower cost
Best For	Large production lines	Startups, SMEs, batch packing
Integration	Inline with filling/labeling lines	Standalone use

---

□ Typical Applications

- **Water Bottle Packs (6/12/24 bottles)**
- **Food Trays**
- **Soap, Pharma Boxes**
- **Cosmetics Packs**
- **Electronics (boxed items)**

✓Optional Add-ons

- Automatic collating system (for bottles, cans)
- Servo motor for high-speed lines
- Print mark sensors for printed film
- Safety curtain or light barrier
- Cooling fans for shrink tunnel outlet


Setting up a BIS-compliant water testing laboratory is essential for obtaining certification for packaged drinking water (IS 14543) or packaged natural mineral water (IS 13428). The Bureau of Indian Standards (BIS) mandates that such laboratories be equipped to conduct comprehensive physical, chemical, and microbiological analyses.

□ Essential Laboratory Equipment for BIS Compliance

1. Physical & Chemical Testing Instruments

These instruments assess parameters like pH, turbidity, total dissolved solids (TDS), and chemical contaminants:

- **pH Meter**: Measures the acidity or alkalinity of water.
- **Turbidity Meter**: Assesses the clarity of water by measuring suspended particles.
- **Conductivity Meter**: Determines the water's ability to conduct electricity, indicating ion concentration.
- **Spectrophotometer**: Analyzes the concentration of specific substances by measuring light absorption.
- **Analytical Balance**: Provides precise measurements of chemical reagents.
- **Hot Air Oven**: Used for drying and sterilization processes.
- **Water Bath**: Maintains samples at a constant temperature during testing.
- **Distillation Unit**: Purifies water samples for accurate testing.
- **Magnetic Stirrer with Hot Plate**: Mixes solutions uniformly during chemical analysis.

2. Microbiological Testing Equipment

Ensures the detection and analysis of microbial contaminants:

- **Bacteriological Incubator**: Provides optimal conditions for microbial growth.
- **Autoclave**: Sterilizes equipment and media to prevent contamination.
- **Laminar Air Flow Cabinet**: Offers a sterile environment for microbiological work.
- **Colony Counter**: Counts the number of microbial colonies in a sample.
- **Microscope**: Allows for the observation of microorganisms.
- **Filtration Assembly with Vacuum Pump**: Concentrates microbes from water samples for analysis.

3. Auxiliary Equipment

Supports various laboratory operations:

- **Centrifuge**: Separates components in a sample based on density.
- **Refrigerator**: Stores temperature-sensitive reagents and samples.
- **Glassware**: Includes beakers, flasks, pipettes, and measuring cylinders for handling and measuring liquids.

These equipment lists are indicative; specific requirements may vary based on the scope of testing and BIS guidelines.

□ Relevant BIS Standards for Water Testing

Compliance with the following Indian Standards is crucial:

- **IS 14543**: Packaged Drinking Water.
- **IS 13428**: Packaged Natural Mineral Water.
- **IS 3025 Series**: Methods for sampling and testing water.
- **IS 10500**: Drinking Water Specification.
- **IS 5401, IS 5402, IS 5887**: Microbiological testing methods