

**TECHNICAL SPECIFICATION FOR FULLY AUTOMATIC  
KINEMATIC VISCOMETER**

This technical specification has been drafted based on the requirements for an Automatic Digital Kinematic Viscometer suitable for high-precision laboratory testing.

## 1. Scope and General Description

The instrument must be a latest-generation, fully automatic digital system designed for the direct determination of kinematic viscosity in liquid petroleum products and synthetic fluids.

- **Compliance:** Must conform strictly to **ASTM D445/D446** standards.
- **Automation:** The system shall feature automatic sample intake/injection, meniscus detection, measurement, reporting, and a dual-solvent tube cleaning and drying cycle.
- **Sample Versatility:** Capable of analyzing new and used oils (including Transformer, Turbine, and synthetic oils/emulsions) ranging from clear/light yellow to dark brown/opaque.

## 2. Performance and Measurement Range

- **Viscosity Range:** Must cover **0.5 to 1000 cSt** (or wider) at 40°C.
- **Resolution:** 0.1 cSt or better.
- **Reproducibility:** Less than 1% (<1%).
- **Flow Detection:** Thermal (thermistor-based), optical (NIR), or suitable automatic detection with a sensitivity of **0.001 seconds**.
- Should have provision for calibration of temperature by certified digital thermometer. It should have provision for viscosity calibration through automatic or manual mode by certified standard calibration fluid supplied with equipment for viscosity.

## 3. Temperature Control and Bath System

- **Operating Range:** Ambient to **100°C** (expandable up to 130°C preferred).
- **Stability:** Precise temperature control with a stability of **±0.1°C** or better.
- **Safety Features:** Must include high/low oil bath level sensors and over-temperature safety alerts.
- **Design:** The bath should allow for easy tube replacement without requiring the bath to be drained.

## 4. Display/Operation/Data output system

- **Control System:** Microprocessor-based unit with a built-in touch screen or controlled via an external PC workstation.
- **Software:** Licensed, user-friendly Windows-based software for data storage, multi-tasking, and printout facility.
- **Hardware Requirements:**

- **PC:** Branded latest-generation workstation (e.g., Dell/HP or equivalent) compatible with the machine software.
- **Monitor:** Minimum 18.5" LED monitor.
- **Peripherals:** Keyboard, optical mouse, and a Black & White Laser Jet printer of any reputed make.

## 5. Essential Accessories and Consumables

The unit must be supplied in "ready to use" condition with the following:

- **Viscometer Tubes:** One tube for 4–690 cSt range and one spare tube covering 7–1270 cSt.
- **Calibration Standards:** Three sets of certified oil standards (ranges: 10–35 cSt, 45–80 cSt, and 600–700 cSt)-1000 ml each.
- **Sample Vials/Vessels:** Minimum 100 plastic and 50 glass sample vessels and a sample cup rack.
- **Maintenance Tools:** 5000ml of cleaning solvent(s), air drying assembly, and a compatible external chiller.
- **Power:** Compatible with 220–240V, 50Hz single-phase AC; supplied with a suitable voltage stabilizer.
- **Thermometer:** One Number Certified digital thermometer to be provided for temperature calibration checking.

## 6. Service and Compliance Requirements

- **Installation:** The instrument is to be installed, commissioned free of cost and proper performance as well as calibration is to be shown at C&M Laboratory of Electric Loco Shed, Valsad (ELS/BL) and all features of the system are to be demonstrated through operation by supplier/ their authorized agent. For this all the reagents, solutions, spares & other things required will be brought by the demonstrator.
- **Training:** Provision of technical training for safe operation and troubleshooting to laboratory personnel.
- **Service:-** On site Service Support facility required at C&M Laboratory of Electric Loco Shed, Valsad (ELS/BL).
- **Documentation:** Supply of Factory Test Certificate, O&M Manuals, and Calibration Manuals.
- **Warranty:** Minimum **one-year on-site warranty** from the date of commissioning.
- The instrument along with its accessories shall preferably be supplied from a single manufacturer except PC, printer and stabilizer.
- Calibration of the instrument with standards is to be demonstrated by the successful bidder during installation at C&M Laboratory of Electric Loco Shed, Valsad (ELS/BL).
- The bidder has to submit the technical compliance sheet of the product quoted/offered in respect to our tender document specifications.

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## ANNEXURE-II

### TECHNICAL SPECIFICATION FOR WORK STATION FOR DATA ANALYSIS OF KINEMATIC VISCOSITY MEASUREMENT DEVICE & THEIR SUB- ASSEMBLIES

The Kinematic Viscometer system shall be supplied with a premium, high-performance All-in-One (AIO) workstation to handle data analysis, instrument control, and report generation. The workstation must meet or exceed the following specifications:

#### 1. Processor and Core Performance

- **Processor:** Latest 13th Generation Architecture (or higher) with a Minimum 10 cores and 12 threads or higher.
- **Performance Class:** High-efficiency designed for stable, continuous laboratory operations.
- **Clock Speed:** Minimum Turbo Boost frequency of 5.0 GHz or higher.

#### 2. Memory and Storage

- **System Memory (RAM):** Minimum 32 GB High-Speed DDR5 to ensure seamless multi-tasking between the viscometer software and office applications.
- **Primary Storage:** Minimum 1 TB M.2 PCIe NVMe SSD with provision for additional storage expansion if required for rapid boot times and high-speed data retrieval.

#### 3. Display and Visuals

- **Screen Size:** 27-inch Full HD (1920 x 1080) LED-Backlit Display or higher.
- **Panel Type:** In-Plane Switching (IPS) technology with Anti-Glare (AG) coating for wide viewing angles in laboratory environments.
- **Color Accuracy:** 99% sRGB color gamut for precise data visualization and graphing.
- **Graphics:** Integrated high-definition graphics capable of supporting the native resolution and external secondary displays.

#### 4. Connectivity and Multimedia

- **Wireless Networking:** Integrated Wi-Fi 6E or higher and Bluetooth connectivity.
- **Camera:** Built-in minimum 5MP Pop-up Infrared (IR) Camera for secure login and video conferencing, featuring a physical privacy design.
- **Audio:** Integrated high-fidelity dual speakers with professional-grade spatial audio processing (e.g., Dolby Atmos or equivalent).
- **Design:** Modern chassis featuring a molded speaker grill and a space-saving footprint.

#### 5. Software and Operating System

- **Operating System:** Pre-installed Licensed 64-bit modern OS (Windows 11 or equivalent).
- **Productivity Suite:** Licensed version of Office Home & Student 2021 (or higher, latest version)
- **Security:** TPM 2.0 (Trusted Platform Module) for hardware-based security.

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## 6. Peripherals and Power

- **Input Devices:** Matching wireless keyboard and optical mouse.
- **Power Supply:** External or internal power adapter compatible with 220–240V, 50Hz AC supply.

## 7. Ports and Interfaces

The workstation shall provide adequate connectivity including but not limited to:

- Minimum four USB ports including at least two USB 3.0 or higher.
- HDMI or Display port
- Audio input/output ports
- Integrated Gigabit Ethernet LAN port.
- Additional USB ports for instrument communication and peripheral connectivity

## 8. System Compatibility

The workstation shall be fully compatible with the viscometer control software and capable of handling instrument communication, data acquisition, result processing, report generation, and long-term data storage.

## 9. Installation and Commissioning

The workstation shall be installed, configured, and integrated with the viscometer system at the laboratory site. All necessary drivers, communication software, and required system settings shall be configured by the supplier.

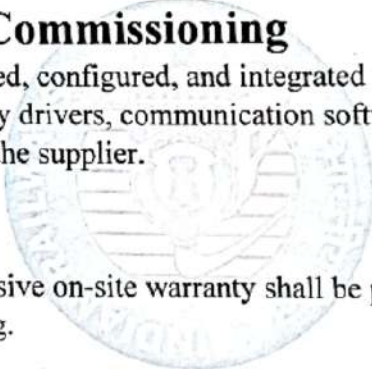

## 10. Warranty


Minimum one-year comprehensive on-site warranty shall be provided for the workstation from the date of commissioning.

## 11. Accessories and Documentation

The supply shall include all necessary cables, adapters, drivers, installation media (if applicable), and user manuals required for complete system operation.

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