

DEFENSIBLE LOGBOOK & CMMS RECORD-KEEPING SOP

Standard Operating Procedure for Audit-Proof Laboratory Logbooks, Electronic CMMS Tracking, Chain of Custody & EPA/OSHA Data Compliance

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1. PURPOSE & LEGAL DEFENSIBILITY FRAMEWORK

This Standard Operating Procedure (SOP) defines mandatory technical protocols for recording, verifying, and archiving laboratory and field servicing data. All vacuum pump maintenance, gauge calibrations, sensor overhauls, and equipment status updates must be logged into bound physical logbooks and the Computerized Maintenance Management System (CMMS) to ensure **complete legal defensibility** under EPA Quality Assurance (QAPP) standards and OSHA 29 CFR 1910.147 guidelines. Non-quantified entries (e.g., 'pump looks good') are strictly prohibited.

2. CORE RECORD-KEEPING PRINCIPLES (ALCOA+ GOVERNANCE)

Principle	Mandatory Standard Requirement	Implementation & Compliance Rule
Attributable	Every record must identify who performed the work.	Sign/initial bound logbooks in indelible ink; unique user login for CMMS entries. No shared credentials.
Legible	Entries must remain readable for 10+ years.	Clean print style in black or blue indelible ballpoint pen. Never use pencil or erasable ink.
Contemporaneous	Recorded at the exact time work is executed.	Log parameters immediately during the service event. Back-dating or pre-logging is a severe QA violation.
Original	Primary source document must be preserved.	First recording is the legal original. Scans must be lossless PDF/A uploaded to CMMS within 24 hours.
Accurate	Exact numerical metrics without rounding.	Record actual instrument units (e.g., Pirani depth in mTorr/microns, FLA in Amps, temp in °C).
Complete	All mandatory form fields completed.	No blank lines or un-checked boxes. Enter 'N/A' with initials for intentionally omitted steps.
Consistent	Chronological integrity maintained.	Entries strictly sequential in bound books with pre-numbered pages. No torn or inserted pages.

3. PHYSICAL BOUND LOGBOOK PROTOCOLS

- Book Architecture:** Only hardbound logbooks with pre-numbered, thread-stitched pages are authorized. Spiral notebooks or loose-leaf binders are prohibited for primary data logging.
- Single-Line Error Correction Protocol:** Erasing, white-out liquid, or scribbling out errors is strictly illegal. Draw a **single horizontal line** through the mistake, enter the correct value adjacent, write a short reason code (e.g., 'transposition error'), and sign/date the correction.
- Blank Space Voiding:** At the end of each work session or page, draw a single diagonal line across any remaining unused space, sign across the line, and enter the date to prevent post-entry tampering.

4. MANDATORY QUANTIFIED MAINTENANCE PARAMETERS

Every vacuum pump and equipment service entry must capture the following specific, quantified parameters:

Equipment / Component	Mandatory Measured Parameters	Pass/Fail Acceptance Threshold
Rotary Vane / Roughing Pump	- Ultimate Base Vacuum (Pirani) - Operating Temperature (°C) - Motor Current Draw (Amps) - Oil Level & ISO Clarity Scale	- Base pressure < 100 mTorr (10–20 µm) - Temp ≤ 70°C - Amps ≤ Nameplate FLA ±5% - Oil clear/light-amber (ISO ≤ 2.5)
Turbomolecular Pump (TMP)	- Rotor Speed (% Nominal / RPM) - Motor Power (Watts) & Bearing Temp - Foreline Pressure (Torr)	- Speed = 100% nominal (e.g. 60,000 RPM) - Temp ≤ 50°C, Power stable - Foreline < 100 mTorr

High-Vacuum Gauge Array	- Atmospheric Zero / Baseline (Torr) - Emission Current (mA) & Filament State - Sensor Head Cleanliness / Resistance	- Pirani 760 Torr ±2% at atm - BA Ion Gauge emission 1.0 mA / 10.0 mA - Megohmmeter pin resistance > 10 MΩ
Filters & Mechanical Drives	- Exhaust Mist Filter Delta P (bar) - Drive Belt Deflection (inches / lbs) - Shaft Coupling Play & Alignment	- Backpressure < 0.5 bar (7 psi) - Belt deflection 1/4"–1/2" under 5–8 lbs - Axial play < 0.005", parallel < 0.05°

5. CMMS WORKFLOW & AUDIT TRAIL INTEGRATION

1. **Work Order Execution:** All maintenance originates from an auto-generated or manual Work Order (WO) in the CMMS. Technicians must log start time, completion time, part numbers, and exact quantities used.
2. **Electronic Document Attachments:** Signed physical checklists, calibration curves, RGA spectrum graphs, and leak detector certs must be scanned as 300 DPI PDF files and attached to the WO within **24 hours**.
3. **System Status Flagging:** If an asset is taken offline for service, the technician must set the CMMS status to 'MAINTENANCE / OFFLINE' (Flag 'M'). Placing an asset back online requires QA sign-off.

6. DOCUMENT CONTROL & AUTHORIZATION SIGN-OFF

Role / Title	Name & Signature	Date	Approval Status
Tier II Vacuum Lab Tech	Kadeem Manning	Oct 24, 2021	APPROVED
Field Operations Manager	Mark Tigges	Oct 25, 2021	APPROVED
QA Program Manager	Genevieve Lariviere	Oct 25, 2021	APPROVED