Dust Collector Fan Bearing Temperature Monitoring & Calibration SOP

1.0 Maintenance Objective & Frequency

The objective of this procedure is to verify the accuracy of the bearing temperature monitoring system on the dust collector fan assembly. Accurate temperature readings are critical for detecting bearing wear, lubrication failure, or misalignment before catastrophic failure occurs. This PM ensures the thermocouple or RTD sensor, wiring, and display/controller are functioning within OEM tolerance.

Frequency: Monthly (or per OEM recommendation, typically every 500 operating hours). Perform this procedure during scheduled downtime to avoid interrupting production.

2.0 Lockout/Tagout (LOTO) & Safety

- Electrical Isolation: Disconnect the dust collector fan motor at the main disconnect switch. Apply a personal lock and tag.
- Pneumatic Isolation: If the fan has a damper actuator, isolate and bleed the compressed air supply.
- Mechanical Lockout: Ensure the fan impeller is fully stopped and cannot rotate. Use a mechanical lock on the shaft if accessible.
- PPE: Wear safety glasses, cut-resistant gloves, hearing protection, and flame-resistant clothing if working near combustible dust.
- Hot Surface Warning: Bearings may be hot if the fan was recently running. Allow a 30-minute cool-down period before touching.

3.0 Required Tools, Parts & Lubricants

- Certified reference temperature probe (e.g., Fluke 52 II or equivalent, with calibrated thermocouple)
- Infrared thermometer (optional, for quick spot checks)
- Digital multimeter (capable of reading resistance for RTD or mV for thermocouple)
- Small flathead screwdriver (for terminal block adjustments)
- Isopropyl alcohol and lint-free wipes (for cleaning sensor contact points)
- Replacement sensor (if found defective, same OEM part number)
- High-temperature anti-seize compound (for sensor threads, if applicable)
- Calibration log sheet or digital CMMS (ServiceGrid) for recording readings

4.0 Step-by-Step Maintenance Procedure

1. Perform full LOTO as per Section 2.0. Verify zero energy state by attempting to start the fan motor (with lock in place) and confirming no rotation.

2. Access the bearing temperature sensor. Remove any protective covers or guards using the appropriate tools. Clean the sensor housing and surrounding area with isopropyl alcohol and a lint-free wipe to remove dust and debris.

3. Visually inspect the sensor, wiring, and connector for signs of physical damage, corrosion, or loose connections. If damage is found, replace the sensor or repair wiring before proceeding.

4. Disconnect the sensor from the controller/display. Using the digital multimeter, measure the sensor output: for an RTD (PT100), measure resistance at ambient temperature (should be ~100 ohms at 0°C, ~138.5 ohms at 100°C). For a thermocouple (Type J or K), measure millivolt output and compare to standard tables. Record the raw reading.

5. Reconnect the sensor to the controller. Place the certified reference temperature probe as close as possible to the bearing sensor tip, ensuring good thermal contact. Allow 5 minutes for thermal stabilization.

6. Read the temperature displayed on the controller/display. Simultaneously read the reference probe temperature. Record both values. The acceptable tolerance is ±2°C (or per OEM specification, typically ±1% of reading).

7. If the reading is outside tolerance, perform a two-point calibration: first at ambient temperature (let the bearing cool to room temperature), then at an elevated temperature (use a heat gun or warm water bath on the sensor tip, not exceeding 80°C). Adjust the controller offset or scaling per the manufacturer's instructions.

8. After adjustment, repeat step 6 to verify the calibration. If the sensor cannot be calibrated to within tolerance, replace the sensor with an OEM-approved part. Apply a thin layer of anti-seize compound to the sensor threads before installation.

9. Reinstall all protective covers and guards. Torque any fasteners to OEM specifications (typically 5-10 Nm for sensor mounting bolts). Ensure wiring is secured away from moving parts.

10. Remove LOTO devices. Restore power to the fan motor. Start the fan and let it run for 10 minutes to stabilize bearing temperature. Monitor the temperature reading on the controller to ensure it rises smoothly and does not exceed the alarm setpoint (typically 80°C for standard bearings).

5.0 Verification & Return to Service

1. Confirm the controller displays a stable temperature reading within ±2°C of the reference probe during steady-state operation.

2. Verify that the high-temperature alarm and shutdown functions are operational by temporarily simulating an over-temperature condition (if safe to do so) or by checking the alarm setpoints in the controller menu.

3. Document all readings, adjustments, and parts replaced in the maintenance log or CMMS (ServiceGrid). Include the date, technician name, sensor serial number, and calibration results.

4. Return the dust collector to normal production operation. Monitor the bearing temperature for the first hour of operation to ensure no drift or instability.

5. Sign off on the PM work order in ServiceGrid, attaching any calibration certificates or photos of the installation.