Industrial Dust Collector Rotary Valve Preventative Maintenance & Calibration SOP

1.0 Maintenance Objective & Frequency

The objective of this procedure is to perform preventative maintenance and calibration on the rotary valve (airlock) of an industrial dust collector. This PM ensures proper airlock sealing, prevents material bridging or jamming, maintains consistent material discharge rate, and extends the life of the rotor, housing, and drive components. Calibration ensures the rotor-to-housing clearance is within OEM specification to minimize air leakage and maintain system pressure.

Frequency: Every 500 operating hours or quarterly, whichever comes first. For high-abrasive or high-temperature applications, reduce interval to 250 hours.

2.0 Lockout/Tagout (LOTO) & Safety

- Electrical Isolation: Disconnect and lock out the main power supply to the dust collector and rotary valve motor at the motor control center (MCC). Verify zero energy state with a voltmeter.
- Mechanical Isolation: Ensure the rotary valve is not under load. If equipped with a backstop or brake, verify it is disengaged.
- Process Isolation: Close all isolation gates or dampers upstream and downstream of the rotary valve. Purge any residual dust or material from the valve housing using a vacuum or compressed air.
- Confined Space: If entry into the dust collector hopper or valve housing is required, follow confined space entry procedures per local regulations.
- PPE: Safety glasses, steel-toed boots, cut-resistant gloves, hearing protection (if near operating equipment), and dust mask or respirator if handling fine particulate.

3.0 Required Tools, Parts & Lubricants

- Feeler gauge set (0.0015 to 0.030 inch / 0.038 to 0.762 mm)
- Torque wrench (0-150 ft-lb / 0-200 Nm range)
- Socket set (metric and imperial, depending on valve hardware)
- Allen key set (metric)
- Dial indicator with magnetic base (0.001 inch / 0.025 mm resolution)
- Feeler gauge for clearance check (0.005 inch / 0.127 mm typical)
- Replacement rotor shaft seals (OEM part number)
- Replacement bearing(s) if worn (OEM part number)
- High-temperature lithium-based grease (NLGI #2) for bearings
- Anti-seize compound (for bolts)
- Clean rags, solvent (isopropyl alcohol or approved degreaser)

- Vacuum cleaner with HEPA filter (for dust removal)

4.0 Step-by-Step Maintenance Procedure

1. Perform full LOTO as per Section 2.0. Verify zero energy state and tag out the equipment.

2. Remove the access cover or inspection plate on the rotary valve housing. Use a vacuum to remove any accumulated dust or debris from the housing interior and rotor pockets.

3. Visually inspect the rotor blades for wear, scoring, or material buildup. If buildup is present, carefully scrape clean using a non-marring tool. Replace rotor if blade thickness is below OEM minimum (typically 80% of original).

4. Inspect the housing interior for wear grooves or pitting. Measure the housing bore diameter at three points (inlet, middle, outlet) using an inside micrometer. Compare to OEM specification. If wear exceeds 0.010 inch (0.254 mm), plan for housing replacement or re-sleeving.

5. Check rotor-to-housing clearance using a feeler gauge. Insert the gauge between the rotor blade tip and housing bore at the top dead center position. Rotate the rotor by hand 90 degrees and repeat for each blade. Record all readings. Acceptable clearance is typically 0.005 to 0.015 inch (0.127 to 0.381 mm) depending on OEM. If clearance exceeds 0.020 inch (0.508 mm), adjust or replace the rotor.

6. Inspect the rotor shaft seals (lip seals or packing). Look for leakage, hardening, or cracking. Replace seals if any damage is found. Apply a thin film of grease to the seal lip before installation.

7. Check bearing condition by rotating the rotor by hand. Feel for roughness, binding, or excessive axial play. If play exceeds 0.005 inch (0.127 mm) or roughness is detected, replace bearings. Torque bearing retaining bolts to OEM specification (typically 30-50 ft-lb / 40-68 Nm).

8. Lubricate bearings with high-temperature lithium grease per OEM schedule. Apply 2-3 pumps of a grease gun if equipped with zerk fittings. Do not over-grease.

9. Inspect the drive chain or belt (if applicable). Check tension (1/2 inch deflection per foot of span) and wear. Replace if worn or stretched. Lubricate chain with appropriate chain lube.

10. Reinstall the access cover or inspection plate. Use a new gasket if provided. Torque cover bolts to OEM specification in a crisscross pattern (typically 15-25 ft-lb / 20-34 Nm).

11. Remove LOTO tags and locks. Restore power to the dust collector and rotary valve motor.

12. Perform a dry run: Start the rotary valve and let it run for 5 minutes. Listen for unusual noises (grinding, squealing) and check for vibration. Verify the rotor rotates freely and smoothly.

5.0 Verification & Return to Service

1. With the dust collector running at normal operating conditions, measure the pressure drop across the rotary valve using a manometer or differential pressure gauge. Compare to baseline. A significant increase indicates air leakage or blockage.

2. Observe the material discharge rate from the rotary valve. Ensure it is consistent and matches the expected flow. If flow is erratic, re-check rotor clearance and material buildup.

3. Check for any air leaks around the shaft seals and housing gaskets. Use a smoke pencil or ultrasonic leak detector if available.

4. Monitor the motor amperage draw on the rotary valve drive. Compare to nameplate FLA. A significant increase may indicate binding or excessive friction.

5. Document all measurements (clearance, pressure drop, amperage) in the PM work order in ServiceGrid. Note any parts replaced or adjustments made.

6. Sign off on the PM work order and return the equipment to production. Update the maintenance history for future reference.