

Dust Collection System Combustible Dust Inspection per NFPA 652

1.0 Maintenance Objective & Frequency

The objective of this procedure is to perform a comprehensive combustible dust inspection on the dust collection system in accordance with NFPA 652 requirements. This PM ensures that dust accumulation is controlled, deflagration protection devices are functional, and the system is operating within safe design parameters to prevent fire or explosion hazards. The inspection must be performed monthly, with additional quarterly deep inspections as outlined in the facility's Dust Hazard Analysis (DHA).

This PM is critical for compliance with NFPA 652, which mandates that all facilities handling combustible dust must implement a written inspection program. Failure to perform these inspections can result in regulatory fines, increased risk of catastrophic events, and voiding of insurance coverage.

2.0 Lockout/Tagout (LOTO) & Safety

- **Electrical Isolation:** Disconnect and lock out the main disconnect switch for the dust collector fan motor and any rotary airlock drives. Verify zero energy state with a voltmeter.
- **Pneumatic Isolation:** Close the compressed air supply valve to the pulse-jet cleaning system and bleed residual pressure from the manifold.
- **Mechanical Isolation:** Ensure all rotating components (fan impeller, screw conveyors) have come to a complete stop before opening access doors.
- **Mandatory PPE:** Wear safety glasses, cut-resistant gloves, flame-resistant clothing (FRC), and a NIOSH-approved N95 respirator or half-face respirator with P100 filters when entering the collection area. Use a combustible dust-rated vacuum for cleanup.
- **Hot Work Prohibition:** No welding, grinding, or use of non-intrinsically safe electrical equipment within 10 meters of the dust collection system during inspection.

3.0 Required Tools, Parts & Lubricants

- Combustible dust-rated vacuum (Class II, Division 2 rated)
- Flashlight (intrinsically safe)
- Digital manometer or magnehelic gauge (0-10 inches w.c.)
- Tape measure (metric/imperial)
- Dust layer depth gauge (e.g., 1/32 inch step gauge)
- Replacement filter cartridges (as needed, per OEM spec)
- Replacement gaskets for access doors (silicone or neoprene)
- Anti-static grounding wire kit (if missing or damaged)
- Deflagration vent burst panels (if damaged or expired)
- Spray lubricant (food-grade, non-static generating, e.g., CRC 808)
- Torque wrench (0-100 ft-lb range)

- Combustible dust test kit (optional, for lab analysis)

4.0 Step-by-Step Maintenance Procedure

1. Perform LOTO on the dust collector fan motor, rotary airlock, and compressed air supply. Verify zero energy state and post personal locks.
2. Visually inspect the exterior of the dust collector housing for signs of corrosion, dents, or damage. Check all access door gaskets for integrity and replace if cracked or compressed.
3. Open the access door to the clean air plenum (filter side). Use the intrinsically safe flashlight to inspect the interior for dust accumulation on the clean side. Any visible dust indicates a filter breach. Record the location and severity.
4. Measure the differential pressure across the filter cartridges using the digital manometer. Connect the high-pressure port to the dirty air side and the low-pressure port to the clean air side. Record the reading. Normal range is 2-6 inches w.c. If above 8 inches w.c., filters require replacement.
5. Inspect each filter cartridge for physical damage: tears, holes, or collapsed media. Use the flashlight to look for light leaks through the media. Replace any damaged cartridges. Torque the retaining bolts to 25 ft-lb.
6. Inspect the pulse-jet cleaning system: check the solenoid valves for proper operation by manually cycling them (with compressed air supply locked out, use a 9V battery to test coil continuity). Verify that the blow tubes are aligned and not clogged.
7. Inspect the dust collection hopper and discharge system. Open the rotary airlock access door and check for buildup or bridging. Clean out any compacted dust using the combustible dust-rated vacuum. Verify that the airlock vanes rotate freely and that the clearance is within 0.010 inches.
8. Inspect the deflagration protection devices: check the burst panel for signs of corrosion, tears, or previous activation. Verify that the panel is rated for the correct static activation pressure (typically 0.5-1.0 psi). If a flameless vent is installed, check the mesh for blockage.
9. Inspect the grounding and bonding system. Use a multimeter to measure continuity between the dust collector housing and the building ground. Resistance must be less than 10 ohms. Check all bonding straps for corrosion or breakage.
10. Measure the dust layer depth on all horizontal surfaces within 10 meters of the dust collector (floor, beams, ductwork). Use the step gauge. If depth exceeds 1/32 inch (0.8 mm), initiate immediate housekeeping per NFPA 652. Document the maximum depth found.
11. Inspect all ductwork for leaks, holes, or disconnected sections. Pay special attention to flex connections and clamps. Use the flashlight to check for dust trails indicating leaks. Tighten all clamps to 15 ft-lb.
12. Lubricate the rotary airlock bearings and fan motor bearings with the approved spray lubricant. Apply one second of spray per bearing. Do not over-lubricate.

5.0 Verification & Return to Service

1. Close all access doors and ensure gaskets are seated properly. Tighten all door latches to 30 ft-lb.
2. Remove LOTO devices and restore power to the dust collector. Start the fan motor and allow the system to reach operating speed.
3. Verify the differential pressure reading on the magnehelic gauge is within the normal range (2-6 inches w.c.). If it is outside this range, re-check for blockages or filter issues.
4. Activate the pulse-jet cleaning system manually and listen for proper solenoid operation. Confirm that the pressure gauge on the compressed air manifold reads 80-100 psi.
5. Perform a visual walk-around of the entire system while it is running. Check for unusual vibrations, noises, or dust leaks. Use the flashlight to inspect duct joints.

6. Complete the combustible dust inspection log in ServiceGrid, including all measurements (differential pressure, dust layer depth, ground resistance) and any corrective actions taken. Sign off on the PM work order.

Regulatory Disclaimer: This document is a generic maintenance template provided for educational and informational purposes only. It does not constitute professional engineering or reliability advice. The end-user assumes all liability for validating all step sequences, torque specs, and LOTO protocols against specific machinery OEM manuals before deployment to a live production floor.