



Thermal Oxidizer Pre-Commissioning Controls Verification Guide

Ensuring Safe & Efficient Startup

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1. Pre-Commissioning Documentation Review

- Verify P&IDs match as-built installation
- Review control panel wiring diagrams against field wiring
- Confirm instrument data sheets are available for all sensors
- Verify OEM startup procedure is on-site
- Check that all factory acceptance test (FAT) documentation is available
- Confirm all change orders and field modifications are documented

2. Control Panel Pre-Power Checks

- Perform megger/insulation resistance test on power wiring
- Verify proper grounding per NEC requirements
- Check all terminal connections for tightness
- Confirm PLC rack configuration matches hardware design
- Verify power supply voltage at panel main disconnect
- Label all unlabeled wires and terminals before energizing

3. Initial Power-Up & I/O Verification

- Energize control panel - verify no faults on power-up
- Walk down all field instruments and verify communication to PLC
- Check all analog inputs at zero and span
- Verify all digital inputs with manual actuation
- Test all digital outputs - verify correct device responds
- Confirm all instrument ranges match PLC scaling
- Tag and document any I/O discrepancies

4. Safety System Verification

- Test all E-stop circuits - verify complete shutdown response
- Verify purge timer operation per NFPA 86 (typically 4 volume changes minimum)
- Test flame failure response - confirm proper lockout timing
- Verify LEL interlock trips at correct setpoint
- Test high-temperature interlock trip points
- Confirm over-pressure and under-pressure safety trips
- Verify all safety interlock bypass switches are OFF and documented
- Test BMS (Burner Management System) safe start check sequence

5. Burner Startup Sequence Verification

- Verify gas train leak test sequence operates correctly
- Confirm pilot ignition sequence timing per OEM specs

- Verify main flame establishment and flame signal strength
- Test low fire/high fire modulation through full range
- Confirm fuel-air ratio control is responding properly
- Verify combustion temperature PID loop tuning (initial settings per OEM, fine-tune on-site)

6. Process Controls Verification

- Verify bed/chamber temperature control loops
- Confirm valve sequencing timing matches design
- Test process inlet temperature high alarm and trip points
- Verify dilution air damper modulation range
- Confirm exhaust fan VFD operates through full speed range
- Test all PID loops for proper response - tune as needed
- Verify trending and data logging are operational

7. HMI & Alarm Configuration

- Verify all HMI screens display correct real-time data
- Test every alarm - confirm annunciation on HMI and horn/beacon
- Verify alarm setpoints match design alarm list
- Confirm alarm acknowledge and reset functions
- Test historical trend displays for all critical parameters
- Verify user access levels and security settings
- Confirm remote access functionality (if applicable)

8. Final Pre-Startup Checklist

- Complete point-to-point I/O checkout sign-off
- Obtain all required permits (air permit, operating permit)
- Confirm stack testing schedule with third-party testing firm
- Verify all temporary construction bypasses are removed
- Complete operator training on HMI and alarm response
- Provide operator with emergency shutdown procedures
- Document PLC program version and create backup
- Obtain plant operations sign-off for initial startup

VIR Automation - Thermal Oxidizer & RTO Controls Specialists

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