INDUSTRIAL BURNER SERVICES INC.

Servicing Combustion Systems and Controls

Sales@Industrial-Burner.com

(513) 347-7070

Service Report

Requesting Customer

Example Report
1 Main Street
Cincinnati, OH 43700-

Equipment Location

Example Report
1 Main Street
Cincinnati, OH 43700-

Customer PO#:

12345

Site Contacts:

John Doe,

IBSI Job#: **11233**

Work Order:

Annual NFPA86 Safety Checks & PME & Burner Tuning 2025

Service Techs - Dates:

Tim Davis - 12/01/2026 to 12/01/2026

Equipment Name / Description

Oxidizer

Nestec RTO #1

Processes Exhaust Fumes from Internal Combustion Engine Testing.
There are 2 system fans in series.
System Fan Rating from Nestec nameplate = 31,086 ACFM

Combustion Chamber

EQUIPMENT

Internal Combustion Chamber & Burner Cone

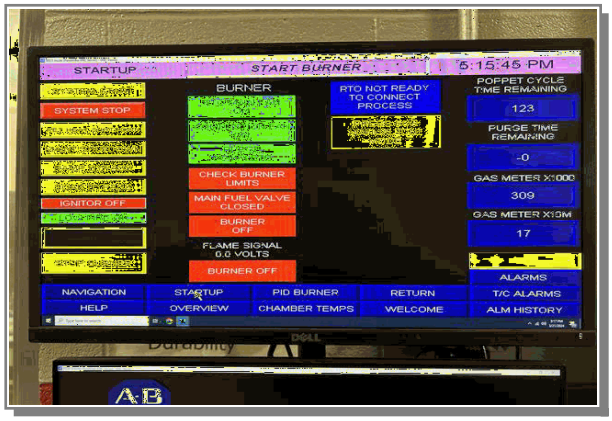
Combustion Chamber Media

- Combustion Chamber was inspected and found to be in good condition.
- Combustion chamber refractory was intact throughout.
- Combustion chamber media was found to be in good condition.
- Burner cone was found to be in good condition.
- Both Combustion Chamber thermocouples A & B were replaced at this visit and were functioning as designed.

Main

CONTROL PANEL

Main Control Panel



Remote HMI

- The control panel, internal components, and wiring are all in good condition.
- All combustion safety limits were tripped and tested.
- All safety limits functioned as designed when tripped however, the combustion air safety switch did not lock out system after shut down allowing the unit to restart without manual intervention.(See Codes)

Combustion Blower

AIR

Combustion Blower Air Inlet

Combustion Blower Air Inlet

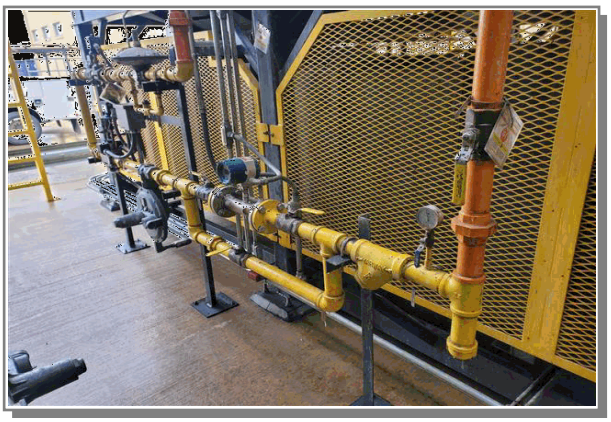
Combustion Blower

AIR

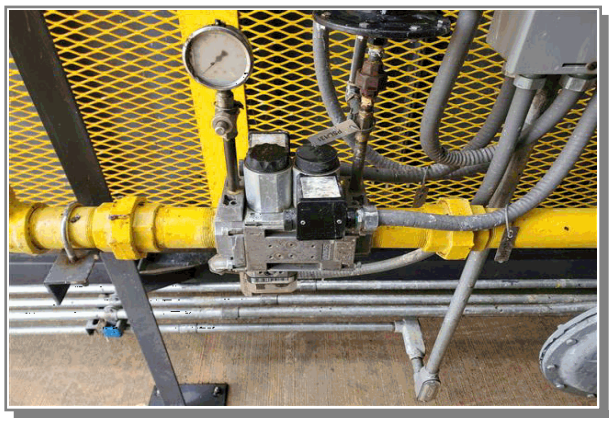
- The combustion air motor and blower were in good condition with no excessive noise and vibration.
- The combustion blower fan wheel was found to be free of dust buildup and in good condition.

Main

VALVE TRAIN



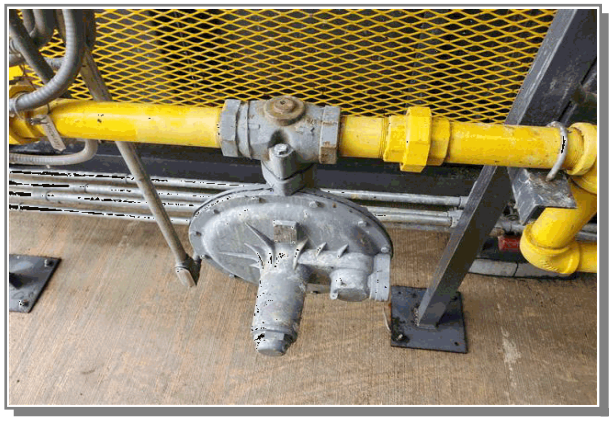
Main Valve Train



Valve Train Dual Safety Shut Off Valve Unit

- The gas valve train was in good condition and all components required by NFPA86 codes are present. All combustion safety components were tripped and tested during this inspection and all components were found to be functioning properly.
- Valve train piping was checked for leaks and no leaks were found.
- Valve seat seal check was performed and no leaks were found.

Drip Leg & Strainer



Regulator

Main

BURNER

Burner System

Burner

- The Burner was inspected and found to be in good condition.
- The burner lit reliably with a good uniform flame.

Main

BURNER

Spark Igniter (Dirty)

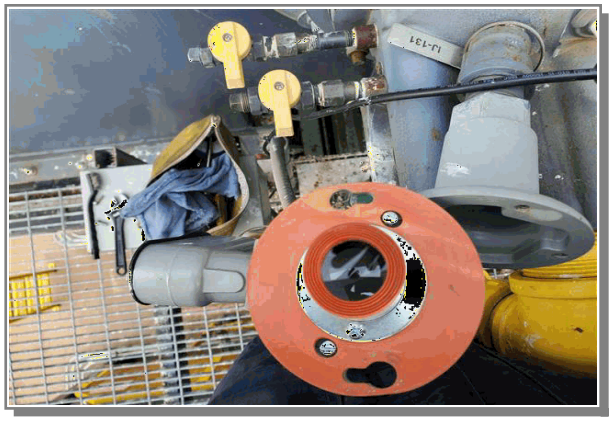
Spark Igniter (Clean)

- The spark igniter was removed, cleaned, inspected and reinstalled. It is in good working condition. Providing consistent spark for a reliable light off.

Flame Supervision

BURNER

UV Scanner



UV Scanner Lens

- The UV scanner was removed, cleaned, inspected and reinstalled. It is in good working condition sending good consistent signal back to the burner controller

Poppet Valves

OXIDIZER

Poppet Valve & Roller Bearings (Chamber 1)

Poppet Valve (Chamber 1)

**Chamber 1

- Poppet valves look good, no stress fractures on the plate.
  *There is one bolt sheared, needs to be knocked out replaced and tacked welded.

-All of the beatings appear to be in good condition and move freely.
-Poppet shaft is in good condition, no grooves or scratches.

Code

Result - Notes - Action Item

Safety Shutdown

2. SAFETY DEVICES

8.2.9*

A safety shutdown of the heating system shall require manual intervention of an operator to re-establish normal operation of the system.

Attention Needed

-Combustion Air Pressure switch shut the burner down, but the burner automatically re-lit w/out purging or manual intervention.
-Correctly Program combustion air pressure switch into the limit string or replace combustion switch with one that has a manual reset on it.

8.2.12

The activation of any safety interlock required in Chapter 8 shall result in a safety shutdown.

Attention Needed

-Combustion Air Pressure switch shut the burner down, but the burner automatically re-lit w/out purging or manual intervention.
-Correctly Program combustion air pressure switch into the limit string or replace combustion switch with one that has a manual reset on it.

8.2.13

Loss of power or signal from a safety interlock shall result in a safety shutdown.

Attention Needed

Same as 8.2.12
Same as 8.2.12

Purge

3. CONTROL PANEL

8.4.1.8

Prior to the re-ignition of a burner after a burner shutdown or flame failure, a preignition purge shall be accomplished.
CAUTION: Repeated ignition attempts can result in a combustible concentration greater than 25 percent of the LFL. Liquid fuels can accumulate, causing additional fire hazards.

Attention Needed

System did not re-purge after shutdown of the Combustion Air Pressure Switch
-Correctly Program combustion air pressure switch into the limit string or replace combustion switch with one that has a manual reset on it.

8.4.1.2.5

Failure to maintain the minimum required preignition purge airflow shall stop the preignition purge and reset the purge timer.

Attention Needed

System did not re-purge after shutdown of the Combustion Air Pressure Switch
-Correctly Program combustion air pressure switch into the limit string or replace combustion switch with one that has a manual reset on it.

Combustion

4. AIR

8.6.4*

Combustion air minimum pressure or flow shall be interlocked into the burner management system by any of the following methods:
(1) A low pressure switch that senses and monitors the combustion air source pressure
(2) A differential pressure switch that senses the differential pressure across a fixed orifice in the combustion air system
(3) An airflow switch

Attention Needed

Combustion Air Pressure Switch when tripped shutdowns the burner, but does not show in alarm. The burner will automatically re-light w/out purging, once remade.
Properly program switch into the limit string on the HMI, or replace switch w/ one that is FM approved and has a manual reset.

Fume Incinerator

7. OXIDIZER

10.6.3.1

The design and operation of combustion systems and controls shall comply with all parts of this standard pertaining to direct-fired ovens.

Attention Needed

All passes except for Combustion air pressure switch. See other codes for details.

Manual Valve Remote Shutoff

5. VALVE TRAIN

Code

Result - Notes - Action Item

Manual Valve Remote Shutoff

5. VALVE TRAIN

6.2.3.1*

An emergency shutoff valve shall be provided that meets the following requirements:
(1) It shall be remotely located away from the furnace so that fire or explosion at a furnace does not prevent access to the valve.
(2) It shall be readily accessible.
(3) It shall have permanently affixed visual indication of the valve position.
(4) A removable handle shall be permitted provided all the following requirements are satisfied:
(a) The valve position shall be clearly indicated whether the handle is attached or detached.
(b) The valve handle shall be tethered to the gas main no more than 3 ft (1 m) from the valve in a manner that does not cause personnel safety issues and that allows trouble-free reattachment of the handle and operation of the valve without untethering the handle.
(5) It shall be able to be operated from full open to full close and return without the use of tools. Isolation valve shall comply with NFPA 54. (See 6.2.4.2.)

Need to verify

Need to Verify if there is a remote valve readily available.

NFPA86 Code Checks Results

2023 NFPA86 Standard

PASSED Inspection

Electrical Grounding

1. EQUIPMENT

6.1.2 - All components of the furnace heating system and control cabinet shall be grounded.

Explosion Relief

1. EQUIPMENT

7.4.9 - Pressure and explosion relief devices shall be visually inspected at least annually to ensure that they are unobstructed and properly labeled.

Operation

1. EQUIPMENT

7.3.1 - The furnace shall be operated in accordance with the design parameters.

Training/Instructions

1. EQUIPMENT

7.2.1* - Personnel who operate, maintain, or supervise the furnace shall be thoroughly instructed and trained in their respective job functions under the direction of a qualified person(s).

7.3.5 - Operating procedures shall be established that cover normal and emergency conditions.

7.3.9 - Personnel shall have access to operating instructions at all times.

General

2. SAFETY DEVICES

7.4.5* - The safety interlock set point of temperature, pressure, or flow safety devices shall be both of the following:
(1) Verified
(2) Documented at least annually

7.4.4 - All safety interlocks shall be tested for function at least annually.

7.4.1* - Safety devices shall be maintained in accordance with the manufacturers instructions.

8.2.6 - Safety devices shall be located or guarded to protect them from physical damage.

8.2.1* - Except as permitted by Section 8.3, combustion safeguards, flame detectors, excess temperature limit interlocks, and safety shutoff valves shall be listed for combustion safety service or approved if a listed device is not commercially available.

Safety Function

2. SAFETY DEVICES

7.3.10 - Safety devices shall not be removed or rendered ineffective.

8.2.7 - Safety devices shall not be bypassed electrically or mechanically.

8.2.7.1 - The requirement in 8.2.7 shall not prohibit safety device testing and maintenance in accordance with 8.2.5. Where a system includes a built-in test mechanism that bypasses any safety device, it shall be interlocked to prevent operation of the system while the device is in the test mode, unless listed for that purpose.

PASSED Inspection

Safety Function

2. SAFETY DEVICES

General

3. CONTROL PANEL

8.2.14 - Safety interlocks shall meet one or more of the following criteria:
(1) Be hardwired without relays in series and ahead of the controlled device
(2) Be connected to an input of a programmable controller logic system complying with Section 8.3
(3) Be connected to a relay that represents a single safety interlock that is configured to initiate safety shutdown
(4) Be connected to a listed safety relay with monitoring that represents one or more safety interlocks and initiates safety shutdown

8.2.15* - All safety function sensors and final elements shall be independent of operating sensors and final elements.

8.2.16* - Electrical power for safety control circuits shall be dc or single-phase ac, 250 volt maximum, one-side grounded, with all breaking contacts in the ungrounded, fuse-protected, or circuit breaker-protected line.

8.6.3* - Motor controlling devices on equipment required for combustion of the fuel shall be interlocked into the burner management system.

8.2.11 - Purge and ignition trials shall be performed using either devices listed for such service or programmable controllers used in accordance with Section 8.3.

High Temperature Limit

3. CONTROL PANEL

8.15.4 - Operation of the excess temperature limit interlock shall require manual reset before restart of the furnace or affected furnace zone.

8.15.5 - Open-circuit failure of the temperature-sensing components of the excess temperature limit interlock shall cause the same response as an excess temperature condition.

8.15.6* - Excess temperature limit interlocks shall be equipped with temperature indication.

8.15.1 - An excess temperature limit interlock shall be provided and interlocked into the burner management system, unless permitted by 8.15.2.

8.15.2 - An excess temperature limit interlock shall not be required for Class B, Class C, or Class D furnaces where it can be demonstrated that the maximum temperature limit specified by the furnace manufacturer cannot be exceeded.

8.15.9* - The excess temperature limit interlock shall indicate its set point in temperature units that are consistent with the primary temperature-indicating controller.

8.15.10 - The operating temperature controller and its temperature-sensing element shall not be used as the excess temperature limit interlock.

7.4.17* - The temperature indication of the excess temperature limit interlock shall be verified to be accurate.

Purge

3. CONTROL PANEL

8.4.1.9* - Repeating the preignition purge shall not be required where any one of the following conditions is satisfied:
(1) The temperature of the chamber where combustion takes place is proved to be above 1400F (760C).
(2)* For a multiburner fuel-fired system not proved to be above 1400F (760C) and with each burner system equipped with two safety shutoff valves that close between each burner that is not operating the fuel supply, at least one burner remains operating in the common combustion chamber of the burner to be reignited.
(3) For a fuel-fired system not proved to be above 1400F (760C) and with each burner equipped with one safety shutoff valve, all of the following conditions are satisfied (does not apply to fuel oil systems):
(a) The number of safety shutoff valves required to close in 8.7.1.12 and 8.7.2.1 will close between the burner system and the fuel gas supply when that burner system is off.
(b) The burner system uses natural gas, butane, or propane fuel gas.
(c)* It can be demonstrated, based on the leakage rate, that the combustible concentration in the chamber and all other passages that handle the recirculation and exhaust of products of combustion cannot exceed 25 percent of the LFL.
(d) The minimum airflow used in the LFL calculation in 8.4.1.9(3)(c) is proved and maintained during the period the burner(s) is off.
(4)* For fuel gas-fired burner systems, and assuming that all safety shutoff valves fail in the full open position, it can be demonstrated that the combustible concentration in the chamber and all other passages that handle the recirculation and exhaust of products of combustion cannot exceed 25 percent of the LFL.
(5)* For fuel gas-fired burner systems, it can be demonstrated that the combustible concentration in the chamber and all other passages that handle the recirculation and exhaust of products of combustion is not in exceedance of 25 percent of the LFL bymeans of a continuous vapor concentration high limits controller used in accordance with 11.6.10 and having been tested at least monthly for this function as per 7.4.8

Trial For Ignition

3. CONTROL PANEL

PASSED Inspection

Trial For Ignition

3. CONTROL PANEL

8.4.2.1 - The trial-for-ignition period of any pilot or main gas burner shall not exceed 15 seconds, unless both of the following conditions are satisfied:
(1) A written request for an extension of the trial-for-ignition period is approved by the authority having jurisdiction.
(2) It is determined that 25 percent of the LFL cannot be exceeded in the extended time.

8.4.2.3 - Electrical ignition energy for direct spark ignition systems shall be terminated after the main burner trial-for-ignition period.

Damper

4. AIR

8.5.3 - Dampers capable of being adjusted to a position that can result in an airflow below the minimum required shall be equipped with one of the following features arranged to prevent oven operation when airflow is below the minimum required:
(1) Mechanical stops
(2) Cut-away dampers
(3) Limit switches interlocked into the safety circuitry

Manual Valve Local Shutoff

5. VALVE TRAIN

6.2.4.1 - Equipment Isolation Valves. Equipment isolation valves shall meet the following requirements:
(1) They shall be provided for each piece of equipment.
(2) They shall have permanently affixed visual indication of the valve position.
(3) They shall be quarter-turn valves with stops.
(4) Wrenches or handles shall remain affixed to valves and shall be oriented with respect to the valve port to indicate the following:
(a) An open valve when the handle is parallel to the pipe
(b) A closed valve when the handle is perpendicular to the pipe
(5) They shall be readily accessible.
(6) Valves with removable wrenches shall not allow the wrench handle to be installed perpendicular to the fuel gas line when the valve is open.
(7) They shall be able to be operated from full open to full close and return without the use of tools.

6.2.3.4 - An equipment isolation valve shall be provided.

Fume Incinerator

7. OXIDIZER

10.6.3.2.1 - An excess temperature limit interlock shall be in- stalled to prevent uncontrolled temperature rise in the oxidizer system.

10.6.3.2.2 - Operation of an excess temperature interlock shall cause the following:
(1) Interruption of fuel to the oxidizer system
(2) Interruption of the source of fumes to the oxidizer system

10.6.2* - Purging. A source air mixture shall not be introduced into a running thermal oxidizer unless one of the following conditions is met:
(1) It shall be demonstrated that the flammable vapor concentration entering the thermal oxidizer cannot exceed 50 percent of the LFL under all anticipated normal and abnormal operating conditions.
(2) Where it is not permitted to discharge the source air mixture directly to atmosphere, the source equipment, connecting ductwork, and thermal oxidizers used to oxidize the source air mixture shall have explosion- prevention and explosion-protection systems designed and installed in accordance with the requirements of NFPA 69.