



# Crombie Industrial Furnace & Oven

*Labor Omnia Vincit*

## **Quality Assurance Manual**

Volume 1 Revision 6  
November 6, 2015

# **CROMBIE INDUSTRIAL FURNACE & OVEN**

## **QUALITY ASSURANCE MANUAL**

The following pages detail the practices and procedures that comprise our quality assurance manual. The fundamental quality documents are NFPA 86, NEC 70 and AMS 2750 and are on file in the office. More stringent specifications are implemented on specific customer requirements. The entire staff of Crombie Industrial is committed to providing a quality service to our customers.

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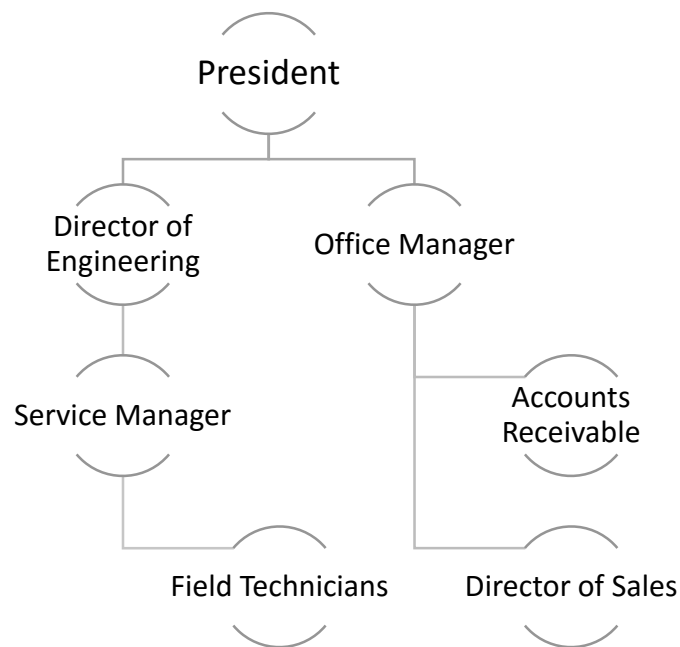
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## **CROMBIE INDUSTRIAL SERVICES MISSION STATEMENT**

At Crombie Industrial not only do we want to watch industry grow in the United States but we insist and strive to play an active role in that growth. Through our involvement in professional organizations, we will continuously improve our knowledge passing this knowledge on to our customers, our deep rooted networks and our most valuable asset: our employees! In them, we will instill the spirit of customer service second to none!

## **ORGANIZATIONAL CHART**



## **EMPLOYEE TRAINING**

Crombie industrial furnace and oven is committed to furthering the advancement of our employee's knowledge and skill in the areas that our field addresses. Training sessions are held monthly and can cover the following areas: safe electrical practices pertaining to the National electrical code, NFPA86 guidelines for furnaces and ovens, fabrication and welding with a thorough understanding of expansion and contraction, pipe threading for various industrial gasses and fluids, electrical and mechanical blueprint reading, fall protection, heat treating and basic metallurgy and pyrometry control. It is the responsibility of the service manager to verify the implementation of this program.

## **LONG TERM IMPROVEMENT PLAN**

It is the intention of Crombie Industrial Furnace & Oven that within 5 years we will have increased our operating facility by an additional 3,000 SqFt. This will allow us to set up a fabrication shop with breaks and presses with the eventual goal of manufacturing high temp furnaces.

## **SHORT TERM IMPROVEMENT PLAN**

It is the intention of Crombie Industrial Furnace & Oven that within the next year we will add PLC Programming to our list of services with the intention of helping our manufacturing partners in automating their furnace & ovens. This will improve their efficiency and lower their labor expectations. Another short term goal of Crombie Industrial is to achieve ISO 9001 Certification.

## **PROCESS CHANGE PROCEDURE**

Periodically it becomes apparent that processes and procedures require a deviation from the engineering parameters. When the field tech determines that this is necessary, these changes are to be submitted to Engineering in writing for further review and discussion determining the best course of action that will ensure safety quality and longevity of the equipment.

## **ANNUAL REVIEW OF QUALITY ASSURANCE MANUAL**

The Quality Assurance Manual at Crombie Industrial Furnace & Oven shall be reviewed annually by the Service Manager. Any requests for revision shall be submitted in writing to the Director of Engineering. Responsibility for implementation of this plan lies with the Service Manager.

## **INTERNAL AUDIT PROCEDURE**

Every six (6) months, the Director of Engineering shall conduct an internal audit of the processes and procedures of Crombie Industrial Furnace & Oven. These audits will be done at random. Results are to be recorded and maintained on file for review.

## **PREVENTIVE ACTIONS**

Preventive actions are implemented when there is an increased risk for a potential nonconformity. The need is identified on the basis of information regarding capability and performance of processes and business operations, service and user feedback, customer complaints, and effectiveness of the quality system. Preventive actions are initiated when quality performance data indicates that there are trends of decreasing quality capability and/or effectiveness of the quality system. The preventive action process consists of: reviewing potential problems, deciding the potential cause of the problems,

deciding the course of action to eliminate the problem from occurring, putting the plan into action and then ensuring or verifying the action solved the problem or is effective over time.

## **CONTROL OF RECORDS**

Record control is essential for the overall efficiency and quality of Crombie Industrial Furnace & Oven and its documents. All records will be maintained in such a way that they are readily available in facilities that provide a suitable environment to minimize deterioration or damage and to prevent loss. Electronic data will be stored and back-up copies made. The control and retention of these documents extends to all work instructions, invoices, customer files, technical files, forms, drawings, procedures, etc. All records will be stored digitally for a period of 10 years.

## **COMMITMENT TO SAFETY**

- LOCKOUT TAGOUT
- CONFINED ENTRY
- PROPER EQUIPMENT OPERATION
- ELECTRICAL HAZARDS IN THE WORK PLACE
- FALL PROTECTION

# HOT WORK PERMIT

CAN THIS JOB BE DONE WITHOUT HOT WORK, OR IN THE SHOP?

IF NOT, ENSURE PRECAUTIONS ARE IN PLACE!

MAKE SURE SPRINKLERS ARE IN SERVICE AND FIRE EXTINGUISHERS ARE READILY AVAILABLE!

This Hot Work Permit is required for any operation involving open flames or producing heat and/or sparks.

This includes, but is not limited to, Brazing, Cutting, Grinding, Soldering, Thawing Pipe, Torch-Applied Roofing, and Welding.

*Note: The Required Precautions are not optional. They are required for fire-safe hot work. Please explain all "No" responses below.*

## Instructions

The Permit-Authorizing Individual must:

- Verify precautions listed at right (or do not proceed with the work)
- Complete and retain this page
- Give the second page to the person doing the work.

## Who, When, and Where?

Hot Work Being Done By

- ☐ Employee  
☐ Contractor

Date

Job/Work Order No.

Location/Building and Floor

Nature of Job/Object

Name of Person(s) Doing Hot Work

I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for work.

Signature of Permit-Authorizing Individual

## Permit Expiration

Expiration Date

Expiration Time

- ☐ AM  
☐ PM

Name of Assigned Fire Watch

**THIS PERMIT IS GOOD FOR  
24 HOURS ONLY!**

## Required Precautions Checklist

- ☐ Available Sprinklers in Normal Automatic mode and valve open.  
☐ Hot Work equipment in good repair.

Assess 35 ft radial "sphere" of work for potential fire hazards:

- ☐ Floors, work level and below, cleaned or protected.  
☐ All other combustibles removed or shielded from sparks.
  - Clean horizontal surfaces (e.g. building structures, equipment, ducts, cable trays, etc.) above and below where possible.
  - Remove flammable liquids, dust, lint, combustible waste, oil deposits, etc., where possible.
  - If removal/cleaning is impractical, protect with fire-retardant covers, or shield with fire-retardant guards and/or curtains.☐ Transmission or conveying of sparks to adjacent areas eliminated or protected.
  - Tightly cover wall/floor openings with fire-retardant material.
  - Where openings cannot be sealed, suspend fire-retardant tarpaulins to help protect areas beneath.
  - Isolate or shut down fans and conveyors to prevent the capturing and conveying sparks to other areas.☐ Explosive atmosphere eliminated or potential not present.

Work on walls, ceilings or enclosed equipment:

- ☐ Construction materials verified as noncombustible and without combustible covering or insulation.  
☐ Combustibles on other side of walls relocated or protected.  
☐ Enclosed equipment cleaned and protected from all combustibles.  
☐ Containers purged of flammable liquids/vapors.

Fire watch/hot work area monitoring requirements:

- ☐ Continuous fire watch provided during and for *at least 30 minutes* after hot work, including all breaks.  
☐ Fire watch supplied with suitable extinguishers/hoses.  
☐ Fire watch trained in the use of fire equipment and sounding alarm.  
☐ Area to be monitored hourly for a *minimum 6 hours* after job is completed, or longer if required.

Other precautions that may be required:

- ☐ Fire watch provided for adjoining areas, above, or below.  
☐ Confined Space or Lock-Out-Tag-Out required/used.  
☐ Area smoke or heat detection disabled to eliminate false trip.

Other: \_\_\_\_\_

Comments:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



## HOT WORK PERMIT

# WARNING! HOT WORK IN PROGRESS WATCH FOR FIRE!

### Instructions

1. **Person doing hot work:** Indicate time started and post permit at hot work location. After hot work, indicate time completed and leave permit posted for Fire Watch.
2. **Fire Watch:** Prior to leaving area, do final inspection, sign, leave permit posted and notify Permit-Authorizing Individual.
3. **Monitor:** After 6 hours, do final inspection, sign, and return to designated area.

### Who, When, and Where?

Hot Work Being Done By	
<input type="checkbox"/> Employee	
<input type="checkbox"/> Contractor	
Date	Job/Work Order No.
Location/Building and Floor	
Nature of Job/Object	
Name of Person(s) Doing Hot Work	
I verify the above location has been examined, the precautions checked on the Required Precautions Checklist have been taken to prevent fire, and permission is authorized for work.	
Signature of Permit-Authorizing Individual	
Time Started	<input type="checkbox"/> AM <input type="checkbox"/> PM
Time Finished	<input type="checkbox"/> AM <input type="checkbox"/> PM
Expiration Date	Expiration Time <input type="checkbox"/> AM <input type="checkbox"/> PM

Work area and all adjacent areas to which sparks and heat might have spread were inspected during the fire watch period and were found fire safe.

Signature of Fire Watch	Time
-------------------------	------

Work area was monitored for a minimum of 6 hours following hot work and found fire safe.

Signature of Monitor	Time
----------------------	------

### Required Precautions Checklist

(must be retained as record of hot work activity for 6 months minimum)

- ☐ Available Sprinklers in Normal Automatic mode and valve open.
- ☐ Hot Work equipment in good repair.

Assess 35 ft radial "sphere" of work for potential fire hazards:

- ☐ Floors, work level and below, cleaned or protected.
- ☐ All other combustibles removed or shielded from sparks.
  - Clean horizontal surfaces (e.g. building structures, equipment, ducts, cable trays, etc.) above and below where possible.
  - Remove flammable liquids, dust, lint, combustible waste, oil deposits, etc., where possible.
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  - Where openings cannot be sealed, suspend fire-retardant tarpaulins to help protect areas beneath.
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- ☐ Construction materials verified as noncombustible and without combustible covering or insulation.
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- ☐ Fire watch supplied with suitable extinguishers/hoses.
- ☐ Fire watch trained in the use of fire equipment and sounding alarm.
- ☐ Area to be monitored hourly for a minimum 6 hours after job is completed, or longer if required.

Other precautions that may be required:

- ☐ Fire watch provided for adjoining areas, above, or below.
- ☐ Confined Space or Lock-Out-Tag-Out required/used.
- ☐ Area smoke or heat detection disabled to eliminate false trip.

Other: \_\_\_\_\_

Comments:




# WARNING!

**HOT WORK IN PROGRESS  
WATCH FOR FIRE!**

IN CASE OF EMERGENCY:

CALL: \_\_\_\_\_

AT: \_\_\_\_\_

# WARNING!

## **FIRE WATCH/MONITOR RECORD**

Checked by (initials)	Date	Time	Checked by (initials)	Date	Time

## NONCONFORMANCE – CORRECTIVE ACTION FORM



**CROMBIE INDUSTRIAL FURNACE & OVEN**

4712 CORDUROY RD.

MENTOR, OH 44060

440-897-2302

### WORKMANSHIP NONCONFORMANCE (WNC)

Date of NC: \_\_\_\_\_ Purchase Order No: \_\_\_\_\_ Date of Work: \_\_\_\_\_

Job No: \_\_\_\_\_ Purchased Parts: \_\_\_\_\_ Vendor ID No: \_\_\_\_\_

Heat No: \_\_\_\_\_ Value (\$): \_\_\_\_\_ Factory Order No: \_\_\_\_\_

\_\_\_\_ Incoming

\_\_\_\_ To be Returned

### **CORRECTIVE ACTION RESPONSE REQUIRED IN 30 DAYS**

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**1. INITIAL ACTION**

**2. ROOT CAUSE**

**3. PREVENTION**

**4. VERIFICATION**

**5. EFFECTIVE DATE**

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#### **GENERAL MANAGER TO COMPLETE**

NAME (PLEASE PRINT): \_\_\_\_\_ TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

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#### **CORRECTIVE ACTION REPORT – THIS WILL BECOME A PERMANENT PART OF YOUR QUALITY HISTORY**

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#### **QUALITY CONTROL MANAGER**

NAME (PLEASE PRINT): \_\_\_\_\_ TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

## LLC DISCLAIMER

- 1. Delivery:** Factory shipping dates given in advance of actual shipment are estimates by Crombie Industrial Services (CIS) and shall not be deemed to represent fixed or guaranteed shipping dates, unless specifically agreed upon in writing and signed by an authorized representative of CIS. CIS shall not be liable for nonperformance, or impossibility of performance, or delay in performance due to the customer, war, riots, fire, acts of God, labor disputes or shortages, material shortages, or a substantial increase in manufacturing costs due to any of the same, breakage of machinery or apparatus, court orders or decrees, or any other cause beyond the exclusive control of CIS. Purchaser agrees to accept delivery of the equipment as soon as reasonably possible after the cause of such delay has been abated. However, in the event such cause or causes shall result in a delay of the estimated shipping date beyond the period of three (3) months from the original shipping date, either party hereto shall have the right upon ten (10) days' written notice to the other party to cancel this agreement. In the event that it elects to cancel this agreement, Purchaser shall pay all costs incurred by CIS, which shall include, but not be limited to, material, labor and overhead, together with a cancellation fee equal to an additional five percent (5%) of the total costs.
- 2. Installation:** All equipment shall be installed by and at the expense of the Purchaser, unless otherwise expressly agreed by CIS in writing. Upon request, CIS will provide a field serviceman to supply technical advice and assistance in the setting up and/or starting of the equipment. The Purchaser shall pay CIS for the services of said field serviceman at stipulated rates plus traveling and living expenses. CIS will not be responsible or liable for any damage resulting from the improper storage or handling of the equipment by Purchaser. Purchaser shall bear the expense of moving the equipment, parts and materials from storage to the installation site.
- 3. Shipping Terms and Title:** Unless otherwise agreed in writing by CIS, shipments shall be made to Purchaser's address listed on the order acknowledgement, F.O.B. CIS's facility. Purchaser shall be liable for all loss and damage which may occur from the time the equipment is delivered by CIS to a common carrier for shipment to Purchaser, and regardless of any such loss or damage, Purchaser shall remain liable to CIS for payment of the full amount of the purchase price. The delivery by CIS to a Common Carrier shall constitute delivery and transfer of title to the Purchaser.
- 4. Terms of Payment:** Payment shall be in United States dollars due as specified in the CIS proposal. Payments not received within the time period specified are subject to a service and carrying charge of one and one-half percent (1 1/2%) per month on the outstanding balance plus any actual expenses, including attorney's fees, incurred by CIS with respect to the collection of such outstanding balance(s).
- 5. Security Interest:** Purchaser hereby grants to CIS a purchase money security interest in the equipment, securing payment of the full purchase price. With respect to the creation of such security interest, the sales order shall be deemed to be a security agreement, with Purchaser and CIS deemed to be the debtor and secured party, respectively. The equipment shall remain personal property, irrespective of whether such equipment is attached to real property. Purchaser's interest hereunder or in the equipment shall not be assigned, sold or otherwise transferred, nor shall the equipment be leased, rented or removed from the address stated herein or such other address as provided by Purchaser for the shipment of the equipment, until the full purchase price has been paid and Purchaser has complied with all obligations hereunder.
- 6. Errors:** The parties reserve the right to correct any typographical or obvious clerical errors, which may be present in the prices, specifications or acknowledgements hereof.
- 7. Claims:** The Purchaser agrees to examine and inspect the equipment and all parts immediately upon receipt thereof and to report in writing to CIS within ten (10) days thereof any damage, defect or shortage and to further file any claims for damages, defects or shortages, as appropriate, with the common carrier. Purchaser's failure to so inform CIS shall be conclusive proof that Purchaser has accepted the Equipment, and that CIS has satisfactorily performed all obligations hereunder. CIS's invoice quantities, terms and prices, established in good faith, shall be conclusive as against the parties. Notwithstanding anything to the contrary, CIS shall have no liability for loss or damage to the equipment occurring when such equipment is no longer under CIS's direct control.
- 8. Cancellation of Orders:** Purchaser may not cancel or terminate the order or direct the suspension of manufacture of the order without the express written consent of CIS. In the event of a cancellation, termination or suspension of this order, Purchaser shall pay to CIS all costs incurred in the cancellation, termination or suspension of this order, which shall include, but not be limited to, material, labor, overhead and a cancellation fee equal to five percent (5%) of the total costs.
- 9. Returns and Restocking Charges:** The equipment may be returned only upon written authorization of CIS. Upon such authorized return, Purchaser shall assume all carrier charges, responsibility for damages in transit and may return only such authorized equipment, which is in undamaged condition. In no event shall returns be

authorized after one (1) year from the original date of shipment. Any credit will be based on the original invoice price or the current price; whichever is lower, less any costs incurred by CIS in the return.

**10. Taxes:** Liability for all taxes now or hereafter imposed by any federal, state or municipal taxing authority, upon the manufacture, sale, transportation or delivery of any equipment covered hereby or any import or export duties which CIS is required to collect or pay, shall be assumed and paid by the Purchaser. Purchaser further agrees to indemnify CIS against any and all liabilities for such taxes or duties and legal fees or costs incurred by CIS in connection herewith.

**11. Patent Indemnification:** Purchaser agrees to indemnify and hold CIS harmless of and from all claims for third parties for the infringement of any patent or trademark arising out of Purchaser's unique design requirements or CIS's compliance with purchaser's unique instructions; and Purchaser agrees to promptly pay or secure any judgment and comply with any and all court orders entered in connection with such claims and to pay CIS's expenses, including attorney's fees, in defending any such claim, action or proceeding. Purchaser must notify CIS within fifteen (15) days after the commencement of any claim or suit-involving Purchaser in which any infringement is alleged, and if CIS is affected, Purchaser shall permit CIS to completely control the defense or compromise or any allegation of infringement.

**12. General Indemnification:** Purchaser assumes all risk and liability arising from purchaser's possession, use and operation of the equipment and agrees to indemnify and hold CIS harmless from any and all loss, damage, claims, suits, liability and expenses, including attorney's fees, arising out of the purchaser's possession, use or operation of the equipment.

**13. Manufacturers' Limited Warranty:** All equipment manufactured by CIS shall be warranted for a period of one (1) year from the date of shipment against defects in materials and workmanship. this limited warranty applies only to the original purchaser and may not be transferred or assigned. If the equipment proves to be defective in material or workmanship during the

warranty period, CIS will, at its option, either repair or replace the defective parts. This limited warranty does not include the cost of removal or reinstallation of the defective parts or the freight or installation costs of any parts replaced by CIS pursuant to this limited warranty. In no event shall CIS be responsible for the improper use or maintenance of the equipment, by the purchaser. parts incorporated in the equipment and not manufactured by CIS are warranted for defects, if at all, by the manufacturer of such parts, and are not covered by this limited sales warranty.

**14. Limitation of Liability:** CIS shall not be liable for consequential damages arising out of or in connection with the use or performance of the equipment or other indirect damages with respect to the loss of property, revenues or profit. In any event, CIS's liability shall be limited to the original purchase price of the equipment, or the actual loss sustained by purchaser, whichever is less. CIS disclaims any warranty of merchantability with respect to the equipment being sold. CIS further disclaims any warranty of fitness for any particular purposes with respect to the equipment being sold.

**15. Governing Law and Waiver of Jury Trial.** The terms and conditions contained herein shall be governed by, and interpreted in accordance with, the laws of the state of Ohio. Purchaser irrevocably consents for all matters of litigation to the jurisdiction of any state or, federal court situated in Lake County, Ohio.

**16. Miscellaneous:** In the event that any provision herein shall be determined to be invalid and unenforceable, same shall not have the effect of rendering any other provision herein invalid or unenforceable, but shall be reformed and construed as if such invalid and unenforceable provision had never been contained herein and such provision reformed to be valid and enforceable to the maximum extent permitted by law. The terms and conditions contained herein shall be binding upon and shall inure to the benefit of the parties hereto, and their respective successors and assigns. Anything herein to the contrary notwithstanding, the rights and obligations herein are not assignable by Purchaser except with the written consent of CIS.

## **SAFETY AUDIT FORMS**

The following pages include Crombie Industrial Furnace & Oven's Safety Audit Forms.

## MOTOR DATA

### MOTOR 1

Use: \_\_\_\_\_  
 Frame: \_\_\_\_\_  
 Horse Power: \_\_\_\_\_  
 RPM: \_\_\_\_\_  
 Amperage: \_\_\_\_\_

	Fuse Size:	Check each line for ground	Check winding resistance	Cold Amps	Hot Amps
L1:					
L2:					
L3:					

### MOTOR 2

Use: \_\_\_\_\_  
 Frame: \_\_\_\_\_  
 Horse Power: \_\_\_\_\_  
 RPM: \_\_\_\_\_  
 Amperage: \_\_\_\_\_

	Fuse Size:	Check each line for ground	Check winding resistance	Cold Amps	Hot Amps
L1:					
L2:					
L3:					

### MOTOR 3

Use: \_\_\_\_\_  
 Frame: \_\_\_\_\_  
 Horse Power: \_\_\_\_\_  
 RPM: \_\_\_\_\_  
 Amperage: \_\_\_\_\_

	Fuse Size:	Check each line for ground	Check winding resistance	Cold Amps	Hot Amps
L1:					
L2:					
L3:					

### MOTOR 4

Use: \_\_\_\_\_  
 Frame: \_\_\_\_\_  
 Horse Power: \_\_\_\_\_  
 RPM: \_\_\_\_\_  
 Amperage: \_\_\_\_\_

	Fuse Size:	Check each line for ground	Check winding resistance	Cold Amps	Hot Amps
L1:					
L2:					
L3:					

**INSPECT THE FOLLOWING PRE-IGNITION SAFETIES FOR PROPER OPERATION**

<b>Purge Timer</b> Is setting appropriate for furnace:	<b>PASS</b>	<b>FAIL</b>	<i>See Formula on Page 6, A1</i>
<b>Internal dimensions of furnace:</b>	<b>L:</b>	<b>W:</b>	
<b>Exhaust Blower (if not present mark N/A &amp; use combustion blower) Cubic Feet per Hour:</b>		<b>D:</b>	
<b>Combustion Blower Cubic Feet per Hour:</b>			

<b>Excess Temp. Control</b> When temp. exceeds set point, does burner shut down:	<b>PASS</b>	<b>FAIL</b>	<i>With burner lit. Turn set point below actual temp. Must shut burner off!</i>
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<b>Combustion Blower</b>	<b>PASS</b>	<b>FAIL</b>

<b>Combustion Blower Air Pressure Switch</b>	<b>PASS</b>	<b>FAIL</b>
When pressure is adjusted above pressure of blower, does burner shut off:		

<b>Recirculation Fan</b>	<b>PASS</b>	<b>FAIL</b>

<b>Exhaust Fan</b>	<b>PASS</b>	<b>FAIL</b>

<b>Low Gas Pressure</b>	<b>PASS</b>	<b>FAIL</b>

<b>High Gas Pressure</b>	<b>PASS</b>	<b>FAIL</b>

<b>Proof of Valve Closure</b>	<b>PASS</b>	<b>FAIL</b>

<b>Visual Proof of Valve Closure</b>	<b>PASS</b>	<b>FAIL</b>

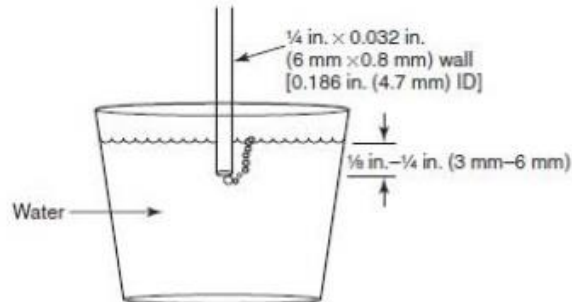
<b>Leak Test Valve Train</b>	<b>PASS</b>	<b>FAIL</b>	<i>See Page 5 for Instructions</i>
Valve 1			
Valve 2			

## This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



## This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

#### LEAK TEST PROCEDURE



With the oven burner(s) shut off, the equipment isolation valve open, and the manual shutoff valve located downstream of the second safety shutoff valve closed, the procedures are as follows:

- 1) Connect the tube to leak test valve No. 1
- 2) Bleed trapped gas by opening leak test valve No. 1
- 3) Immerse the tube in water. If bubbles appear, the valve is leaking. Contact supervisor for course of action if there is a leak.
- 4) Apply Auxiliary power to safety shutoff valve No. 1. Close leak test valve No. 1. Connect the tube to leak test valve No. 2 and immerse it in water.
- 5) Open leak test valve No. 2. If bubbles appear, the valve is leaking. Contact supervisor for course of action if there is a leak.

## INSTRUCTIONS

A1

### Purge Timer:

CuFt of oven or furnace interior or FCE x4 = How much air or inert gas in CFH is required to purge unit

$L \times W \times H = \text{CuFt}$

\* Exhaust blower CFH / 60 = CuFt/min

An oven with an interior (including all chambers) equaling 100CuFt requires 400CuFt of purge air or inert gas to properly purge the unit.

Oven 100 CuFT

Blower 6,000 CuFt

$6,000 \text{ CFH} / 100 \text{ CuFt} = 60 \text{ air changes per hour}$

$60 / 60 \text{ min} = 1 \text{ air change per min}$

$1 \text{ min} \times 4 \text{ (Number of air changes required by NFPA)} = 4 \text{ minute purge time required}$

\* Use combustion blower CFG where exhaust blower is not present