OVEN ASSEMBLY MANUAL
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TOOLS REQUIRED

1. Welding machine
2. Saw for cutting flashing, floor channel and 2” angle interior trim
3. Screw gun
4. Caulk gun
5. Large knife (for cutting filter insulation)
6. Chalk line
7. 4’ level
8. Tape Measure
9. Hammer drill with bit for 3/8” floor anchors and 3/8” floor anchors (used for ovens without floors)
10. Clamps
11. Come-a-long
12. Drill
1. **Introduction**

All *Col-Met Spray Booths, Inc.* ovens are thoroughly tested during the assembly process. Most installations are therefore relatively simple. Installation typically includes unloading the oven, moving the oven to the desired installation site, attaching gas and electric service, and attaching the exhaust stack. Some installations require the burner box to be installed at the jobsite. Larger ovens may require some mechanical assembly at the jobsite. *Col-Met Spray Booths, Inc.* does not normally provide installation services. However, supervision services for any or all parts of the installation process are available from *Col-Met Spray Booths, Inc.*

Only qualified personnel should perform the installation. Specifically, qualified personnel typically include equipment riggers, electricians, mechanical contractors and properly trained end user personnel.

2. **Unloading, Handling and Placement**

2.1 **Unloading and Moving the Oven**

Smaller ovens are normally shipped by motor freight. They can usually be unloaded by forklift. Larger ovens are shipped with special carriers. They are typically wrapped in plastic and/or covered with tarps. Larger ovens can be unloaded by lift truck. A spreader bar must be used when lifting burner boxes from overhead. Anytime a lift truck is used in handling an oven, the forks should enter from the sides of the oven and go under the oven frame. Larger ovens that require unloading by lift truck may require two or more trucks. Special care should be taken in using lift trucks to unload ovens.

Handling the oven on the floor often includes means such as shuffling pipes, material handling carts, special equipment or dragging. Qualified equipment riggers are all familiar with these methods. All material handling carts and equipment should support the oven frame. Do not place handling carts under the middle of the oven unless the frame is also supported. If the oven has a removable overhead burner box, overhead hoists are necessary for reassembly.

2.2 **Oven Location**

The oven should be located at or above grade on a level, non-combustible floor. Adequate space should be provided above the oven and on all sides to permit routine maintenance and inspection. A minimum of three feet clearance must be maintained between the oven and any combustible walls or ceiling. The explosion proof relief doors and hatches cannot be obstructed. Per NFPA 86 and OSHA 1910.107 (2), no open flame or spark-producing equipment shall be located in any area where volatiles are sprayed or within 20 feet of such a spray area, unless separated by a partition. This would also include mixing areas, paint storage areas or any flammable materials.
2.3 Leveling the Oven and Proper Door Operation

It is common when installing the oven for the doors to appear to be hinged improperly. It is especially deceiving when an oven has doors on both ends. The oven must be level for proper door operation. If it is not level, place a shim under one corner of the oven frame. If the leveling improves with the shim, continue adding shims until the doors are level. Shims may be required on more than one door for those ovens with doors on both ends. See Section K for more information on leveling the doors.

2.4 Removing Shipping Supports

Occasionally, temporary supports are built into the oven frame to provide reinforcement during shipping and handling if the oven is shipped assembled. Specifically, ovens with steel plate floors or those ovens without any floors usually have angle iron supports across the bottom of the doorways. After the oven has been located at the place of final installation, these supports should be cut out.

2.5 Securing the Oven

Shipping brackets and floor mounts are attached to the sides of the oven at the base of the frame if the oven is shipped assembled. After the oven has been properly located and leveled, it should be anchored to the floor. If the oven has a steel plate floor, it may be desirable to secure the oven floor to the plant floor. A steel plate floor tends to buckle in ovens of larger sizes and higher operating temperatures. Holes in the steel plate floor can be made by drilling or torch-cutting.

3. Special Requirements

Most ovens are tested at Col-Met Spray Booths, Inc. prior to shipping. However, for shipping and handling purposes some ovens require final assembly at installation. Height restrictions in shipping and handling sometimes require that burner boxes be built removable and the oven cabin be shipped knocked-down flat. Width and depth restrictions sometimes require that the oven be built in sections. Occasionally, at the customer’s request, the control panel might be built for remote installation. In these cases, the reassembly requirements are minimal. Each of these scenarios are discussed in detail below. Col-Met Spray Booths, Inc. supervision is available for any or all parts of the installation.

1.1 Burner Box

1. The burner box houses the recirculation fans and the burner. The fan motors and air seals are also generally attached. If the oven has the burner box removed from the oven then the following steps are required for reassembly: Pick up the burner box using overhead means. See Section H for more detailed instructions.

2. Verify that the turning vanes for the fans are secured to the blower housings at the bottom of the burner box.
3. Make sure the gasket tape is in place on top of the oven inside the burner box frame.

2. Place the burner box within the frame on the top of the oven. The oven control panel is attached to the burner box. There is a circuit breaker located in the panel for connection to the main incoming power. After the oven shell is complete, wiring will have to be run to the exhaust fan, exhaust fan flow switch, oven thermocouple (type “J” thermocouple wire - included), and to the remote control panel. Notes on the schematic inside the control panel door list the wiring connections to be made.

3. Weld the burner box to the frame on top of the oven.

4. On larger ovens, belt guards are shipped separately. Attach the belt guards using the included sheet metal screws.

5. On the inside of the oven, the top air supply and return plenums should be secured to the sheet metal housing inside the burner box by sheet metal screws.

3.2 Exhaust Fan

The exhaust fan assembly includes the exhaust blower, motor and air seal. If the exhaust fan has been removed from the oven, the following steps are required for reassembly:

1. Pick up the exhaust fan assembly using a forklift or overhead means.

2. Attach the exhaust kit to the top of the oven using the attached bolts and sheet metal screws. The exhaust kit is located over the large diameter hold in the top of the oven and the orientation will be obvious with the bolt and screw hold patterns.

3. Reattach the electric wires from the kit to the adjacent junction box.

4. Reconnect any air tubes that have been disconnected.

3.3 Remote Control Panel (HMI)

The oven remote control panel is a Touch Screen. A 3 conductor shielded cable is required for communication between the Touch Screen and the oven PLC. 3 additional control wires are needed for the control power and E-stop button. The E-stop removes all power from the PLC. WARNING, Press the Touch Screen Stop before pulling the E-stop back out. The PLC does not know the power has been removed and will immediately restart any equipment that was energized when the E-stop was pressed. The Touch Screen panel generally includes all controls that the operator must use on a daily basis, such as any temperature controls, start/stop switches, batch timer. The main control panel will contain the PLC, motor starters, the flame safety and the electrical service disconnect.

3.4 Thermocouple
The thermocouple should be installed in the roof of the oven, halfway between the burner box and the exhaust fan. A length of Type “J” thermocouple wire will be included with the oven. The wire is generally packed inside the remote control panel. The wire will be run from the thermocouple to the main control panel and should be in its own conduit to avoid interference with other controls. The polarity of the thermocouple should be matched (white – positive and red – negative).

4. **Connecting Utilities**

Installation of the oven requires the connection of utilities. All ovens require electric service for powering the motors and controlling the oven. All gas ovens require the connection of gas service. Almost all ovens require the connection of an exhaust stack. Ovens with a dry chemical fire suppression system require that the end user contact a local fire control specialist for fire control system activation.

4.1 **Electric Service**

An electric disconnect for the oven has been attached to the control panel. The service line supplying the power to the oven should also be equipped with a disconnecting device with interrupting capability to clear the maximum fault current capacity of the immediate power supply system. A qualified electrician should attach the appropriate power to the disconnect.

1. All electrical installations should be in accordance with the National Electric Code.

2. **Connect a ground wire from the grounding lug to a known ground.**

3. Connect the appropriate electric service to the disconnect on the control panel. The wire should be sized per the amperage rating of the circuit breaker and the National Electric Code.

4. Control voltage provisions are not necessary. They have been addressed by a factory-mounted transformer located inside the control panel.

4.2 **Gas Service**

In order to operate properly, the oven requires a specific inlet gas pressure. *Col-Met Spray Booths, Inc.* ovens are designed to operate on a gas supply pressure of 5 PSI maximum and 2 PSI minimum. Do not exceed this gas pressure. A qualified mechanical contractor should be able to size the gas lines and regulators accordingly. See the following note if you will be using propane gas:

**NOTE: PROPANE GAS OVENS**

If it was not specified at purchase that your installation would be serviced by propane gas, then some modifications to your oven will be necessary. Call *Col-Met Spray Booths, Inc.* for instructions. If propane gas service was specified at purchase then no special provisions are required. You should follow the instructions above.
4.3 Exhaust Stack Installation

Any oven that is fueled by gas and any oven that is used to process a product that contains flammable volatiles or combustible material must include a powered exhaust fan. Exhaust stack is not normally provided with the oven. You must contact a local mechanical contractor or supplier for the appropriate ductwork.

4.3.1 Exhaust Stack Type

The type of stack required varies with exhaust temperature and the mechanical specifications of the building in which it is installed. Consult your local building and equipment authority for the relevant building code. In order to meet NFPA Standard 211 for Chimneys, Vents and Solid Fuel Burning Appliances a positive pressure stack rated for the applicable temperature is required.

4.3.2 Stack Termination (NFPA 211 – Section 4)

A metal chimney for an oven operating up to 500°F should extend at least three feet above the highest point where it passes through the roof and at least two feet above any portion of the building within ten feet laterally. For those ovens operating at temperatures greater than 500°F but less than 900°F, the chimney should extend at least ten feet above the highest point where it passes through the roof and at least ten feet above any portion of the building within 25 feet laterally.

4.3.3 Stack Clearances (NFPA 211 – Section 4)

A metal chimney should have a clearance of not less than 24” from any wooden construction or combustible material. A metal chimney shall have a clearance not less than 2” from any non-combustible structure. A metal chimney erected on the outside of a building shall not be installed any closer than 24” to any door, window or walkway. Consult NFPA 211, Section 4 for details on installation of a chimney through any story of a building or a combustible roof.

4.3.4 General Requirements

The oven’s rated CFM was calculated using 20-foot tall, straight vertical exhaust stacks with no bends or turns. Any bends or turns in the exhaust stack may restrict the exhaust, causing a reduction in the maximum gallons of solvent that the oven can safely handle. If it is not practical to run the exhaust in this manner, a pressure drop analysis can be performed on your exhaust ducting by the engineering staff of Col-Met Spray Booths, Inc.

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Section A

Floor Assembly

Step 1. Floor Assembly With 1/4” Floor Plate (optional).
(A) Lay two sections of the floor plate down.

(B) Square corner to corner and weld together. Weld 2” long approximately 10” apart. Continue until base is completely together per dimensions on your set of drawings (see Dwg. 1-B).

Note: Standard ovens DO NOT have ¼” floor. Step (A) is not required.

Step 2. Floor Channel (All Dimensions Are On Customer Set of Drawings)

(A) Take chalk line and layout lines for O.D. (outside dimensions) & I.D. (inside dimensions) of oven side walls and one end wall if oven is single entry. If oven is double entry you only need side walls.

(B) Cut if necessary T-4 channel, lay between lines and attach channel the full length of the oven. If it is a single entry you must 45° one end of each side wall floor channel and both sides of end wall floor channel (see Dwg. 3-B).

(C) If oven has ¼” floor, you can weld floor channel to floor plate. If it has no floor, you must drill holes in bottom of channel for anchor bolts. Anchor with 3/8” floor anchors (not supplied) approximately 12” from each end and then every 6 ft. If heater box is floor mounted, you must cut T-4 or T-6 so you leave an opening for it. You get opening width and location from customer drawing (see Dwg. 3-C).
SEE CUSTOMER DRAWING FOR WIDTH

6" MAY VERY

0 BASE CHANNEL RUN LENGTH OF WALL 3 SIDES

ANCHOR PLATE TO SHOP FLOOR AS NEEDED

SKIP WELD PLATES TOGETHER AS NEEDED

1/4" FLOOR PLATE OPTIONAL

FOR SINGLE ENTRY

4" TYP

SEE CUSTOMER DRAWING FOR LENGTH

DWG 3-B
T4 BASE CHANNEL RUN LENGTH OF WALL 3 SIDES

1/2" Ø HOLE FOR 3/8" Ø ANCHOR BOLT (NOT FURNISHED)

SEE CUSTOMER DRAWING FOR PART NUMBERS

OPENING FOR HEATER BOX
SEE CUSTOMER DRAWINGS
FOR SIZE & LOCATION

1/4" FLOOR PLATE OPTIONAL
FOR SINGLE ENTRY

4" TYP

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DWG 3 C
Section B

Wall Assembly

Step 4. Installation of Walls.

(A) Fill male side of oven panel with 1 ½” x 4” strip insulation and put approximately ¼” to ⅜” bead of oven cement on female side of panel (Dwg. 4-A).

(B) Start installation with first panel (see panel layout for panel number) at door opening (see dwg. on placement of 1st panel).

(C) After placing first panel, use 4 ft. level to get panel plumb. Put two Tek Screws in bottom end of panel. This should hold panel in place. Put all Tek Screws in bottom of panels as you go.

(D) Most panels are standard 26” repeat. You should mark floor channel for both walls because when you install your panels you may get some tighter together than others. With base channel marked 26”, you will keep both walls together and the same length. All panels must have strip insulation and oven cement bead. Cement bead always goes to inside of oven.
STEP 4-A

1/4" TO 3/8" BEAD OF OVEN CEMENT
THIS ALWAYS GOES TO INSIDE OF OVEN

STUFF WITH LOOSE MIN WOOL
Step 5. **Installation of Top Angle for Roof. (Item T-7)**

(A) The inside height of the oven should be determined by the height of the wall panels. All T-7 angles come in 10 ft. lengths. If the oven length is longer than 10 ft., you need to add whatever length is needed. You must keep angle the same from the floor to the top of the angle all the way down complete length of oven installing Tek Screws as you go (see Dwg. 5-A).

(B) When you install top angle across back of oven, you must notch and weld end to top angle of side walls.
Section C

Door Header and Side Wall Face Channel

Step 6. Installation of Side Wall Face Channel and Door Header.

(A) You will have two (for single entry oven) and four (for double entry oven) C4 x 5.4 channels with ¼" holes 12" apart (see customer prints for item number).

(B) Install these by forcing them over the male end of the side wall panel. Make sure top and bottom of channels are flat against panel (see drawing). Put 4 ft. level on face of channel to insure face of the oven is plumb. If both sides are not plumb, the doors will not seal properly. Install all Tek Screws (Dwg 6-B).

(C) Get proper measurement from customer drawings and mark location face channel for door header. Place door header on mark. The ¼" end plates on the door header should be flush with outside of the face channel. Tack door header in place (see Dwg 6-C) (do not weld solid until door opening is squared, after step 6-F).
SEE STEP 6-C FOR FLOOR

SECTION "C"

DWG 6-C
(D) Use tape measure and check to make sure the top and bottom measurements are the same (outside of face channel).

(E) Measure from corner to corner to insure opening is square (see Dwg. 6-E).

(F) After all openings are square, tack a brace to hold in place (Dwg. 6-F). Use a piece of T-7 angle for this. Weld door header solid at top in both ends, and to floor channel on both sides at bottom. If the ¼" floor is used, weld across front of face channel at bottom. With double entry oven this step must be done on both ends.
WELD SOLID FOUR CORNERS

STEP 6-F  DWG 6-F

See customer drawing for oven width.
Step 7.  Installation of Header Panel.

(A)  Insulation needs to be placed in male side of header panel (see customer panel layout for number).

(B)  Force header panel down into header channel and install all Tek Screws (see Dwg. 7-B).

(C)  Cut and install T-7 across front on the inside. Notch as necessary to fit T-7 mounted on side walls. Install Tek Screws and weld both ends (see Dwg. 7-C).

Note: A bead of oven cement needs to be placed on T-7 before installing Tek Screws.
STEP 7-C

1/4" TO 3/8" BEAD OF OVEN CEMENT

DWG 7-C
Section D

Roof Assembly

Step 8. Installation of Roof Panels.

(A) Put a bead of oven cement on all T-7 angles before you start to install panels.

(B) Put insulation and oven cement on 1st panel that attaches to header panel (see customer drawing for the panel layout). Every panel must have strip of insulation and bead of oven cement before they are installed (see Dwg. 8-B).

(C) Repeat installation of roof panels per panel number call out on customer drawings.

(D) Install two panels and measure on each side to maintain the same measurements side to side. It is possible to get one side pushed in more than the other, and they will not come out correct at the end. Install Tek Screws in each panel after making sure both sides are even. Put Tek Screws in each panel as they are installed.
T-7 ANGLE ALL AROUND INSIDE OVEN

SECTION "D"

STEP 8-B

SEE STEP 6-C FOR FLOOR

DWG 8-B
Section E

Flashing – Wall & Roof (Interior & Exterior)


(A) The ovens that have an opening on one end only needs T-7 angle in back two corners. Get measurement between top (T-7) angle and bottom (T-4 or T-6) at back. Cut two T-7 angles, apply oven cement to both legs of angle (Dwg. 9-A), and tek screw in corners. After Tek Screws have been installed, weld top and bottom of angles.

(B) Get measurement from bottom of T-7 attached to roof panel and bottom of header channel (on door end), cut 2 pieces of T-7, apply oven cement and tek screw in place. Weld top and bottom (see Dwg. 9-B).

(C) Install filler insulation in all openings before installing exterior flashing (see Dwg. 9-C).

(D) Start T-9 flashing approximately 18” from each corner. The four fabricated corners (installed later) will take care of this 18”. If more than one 10 ft. section needs to installed (because of oven size), then overlap the two pieces at least 6” (to keep from cutting you can overlap more than 6”) (see Dwg. 9-D).

(E) After placing a section of T-9 on corner, use a framing square to keep flashing square with walls and roof (see Dwg. 9-E).

(F) To install fabricated corners, place piece on each corner and using Framing Square, install with Tek Screws as required.
1/4" TO 3/8" BEAD OF OVEN CEMENT

STEP 9-A

T-7

WALL PANELS

DWG 9-A
CORRECT

STEP 9-E

INCORRECT

DWG 9-E
Section F

Flashing – Openings

Step 10. Installation of Opening Flashing (These openings will be for heater box installation. See customer drawing for locations and opening size).

(A) Install insulation in ends and edges of panel opening (see Dwg. 10-B).

(B) For each opening, cut four each of T-20 (4” panels) or T-21 (6” panels). Cut two each for each direction. (Dwg. 10-B).

(C) Slip 1” flanges over edges of panels, push in all the way and tek screw to panels as required.
Section G

Heater Box Installation - Floor Mounted

Step 11. Heater Box

(A) Make sure the opening for the heater box has been properly flashed.

(B) Apply oven cement to both T-7 angles that are welded to box (see Dwg. 11-B).

(C) Locate opening in wall for heater box. See customer drawings for location.

(D) On the heater box is a section of duct extending out. This duct must go through the opening in the wall (see Dwg. 11-D).

(E) Push heater box in flush and tight against wall. It must be tight for it to seal properly.

(F) Install Tek Screws as required.

(G) Get measurement across top of box and cut section of T-15 flat flashing. Apply oven cement to top of oven and top of heater box as shown (see Dwg. 11-G). Attach T-15 with Tek Screws as required.
1/4" TO 3/8" BEAD OF OVEN CEMENT

AIR HEATER BOX

STEP 11-B

DWG 11-B
1/4" TO 3/8" BEAD OF OVEN CEMENT

OVEN

OPENING

DUCT SECTION

AIR HEATER BOX

STEP 11-D

DWG-11-D
1/4" TO 3/8" BEAD OF OVEN CEMENT UNDER T-15

OVEN

AIR HEATER BOX

T-15

T-15
Section H

Heater Box Installation - Top Mounted (Floor Mount not Required)

Step 12. Heater Box

(A) In the kit there are four each fabricated supports that need to be welded to the heater box before it is set on top. Get the item number from the customer drawings. Install and weld solid per Dwg. 12-A. (There are 2 left hand and 2 right hand).

(B) In the heater box there is a section of duct that extends out of the box. This slides in the opening left when the roof panels were installed. When installing the heater box, place the heater box so the duct and the opening are in line. **Do not** put weight of box on oven at this time (see Dwg. 12-B).

(C) When the duct and opening are in line this will give the location for four support legs (see customer drawings for item number).

(D) To install legs, line them up under the fabricated supports that were installed earlier. Use a level to make sure they are plumb, and then anchor bottom with 3/8” floor anchors (not supplied) against oven wall. Install Tek Screws all the way up the wall on legs.

(E) Apply oven cement to bottom of T-7 angle attached on four sides of heater box as shown in Dwg. 12-E.

(F) Set the heater box down on oven and support legs. Make sure box is flat down on roof panels so it will seal.

(G) Install all Tek Screws in the heater box angle to top of oven panels on all four sides (see Dwg. 12-F).
STEP 12-E
**Section I**

**Installation of Duct Work**

**Step 13. Duct Work**

(A) Start with duct section that attaches to heater box first. Get item number from customer drawings.

(B) In this section of duct there is an opening for duct extending out of heater box. Center this opening on duct, make level and install Tek Screws 3" off edge of opening on all four sides and in T-7 angle top and bottom of duct (see Dwg. 13-B).

(C) In the kit there is a 10 ft. section of formed angle (no holes). Cut four of these to go around heater box duct. Apply oven cement to both sides of this angle (see Dwg. 13-C).

(D) Install this angle on four sides with Tek Screws as shown in Dwg. 13-D.

(E) Place 14 ga. Cover plate over the opening and install Tek Screws.

(F) Each section of duct has angle frames attached so each section will attach together and line up with the next section of duct (get number from customer drawings). Clamp angle together and make sure duct is level. Install Tek Screws in T-7 angle attached to top and bottom of duct. Angle frames can be tek screwed together or welded (see Dwg 13-F).

(G) Continue on both sides of oven with each section of duct (get numbers from customer drawings). Last section of duct will be capped on end.
ISOMETRIC DETAIL

TEK SCREW OR WELD TOGETHER

ISOMETRIC DETAIL

DWG 13-F
Section J

Installation of Door Opening Support Channel

Step 14. Door Opening

(A) Get item number from customer drawings for the door opening support channel. Make sure the door opening is square.

(B) Make marks 18” back from face of channel on the end wall (see Dwg. 14-B).

(C) Place vertical channel on marks setting on floor, this channel should extend 2” above top of oven. Install two Tek Screws in channel to hold in place. Install 3/8” floor anchors (not supplied) in angle at bottom of channel. Install channel on the other side of the door in the same manner.

(D) Place top channel on over top, line up with two vertical channels and weld in place.

(E) Install the rest of the Tek Screws.

(F) In the kit there are four short channels 17” long (see customer drawings for item numbers). These braces weld to face channel and support channel (see Dwg. 14-B).

(G) Install Tek Screws as required.
Section K

Installation of Doors

Step 15. Door

(A) When installing the doors, there should be a 1” gap at bottom and a ½” gap at top. When the doors are installed there is a ½” gap between door and face channel (1” and ½” spacers are in package with latches).

(B) Lay two (2) 1” spacers on floor in front of oven and place door on these. Put ½” spacers between door and face channel (see Dwg. 15-B). If the floor, doors, or openings are not perfect you can adjust by shimming under the door on one side or the other to get the doors to line up with each other (see Dwg. 15-B).

(C) When you have made required adjustments, weld hinges to face channel.
NOTE: SPACERS ARE WITH LATCH

SHIM HERE

SHIM HERE

DWG 15-B
Section L

Installation of Door Seals

Step 16. Door Seals

(A) In the kit there will be Fiberglass Tad Pole Gasket, hold down strip 10 ft. long (cut as required), and fiberglass drag seal (cut as required).

(B) Dwg. 16-B shows where gasket is to be installed down both sides and across the top.

(C) Tek screw strip on top of gasket as shown in Dwg. 16-B.

(D) The door stop tube on the left door needs the Fiberglass Tad Pole Gasket installed on it (see Dwg. 16-C).
INSIDE OVEN DOOR

INSIDE OVEN DOOR

FIBERGLASS GASKET TAD-POLE

HOLD DOWN STRIPS 16.GA

DRAG SEAL 1/8" X 3" FLAT FIBERGLASS CLOTH

SECTION A-A

DWG 16-A
COTH GASKET TAD-POLE
HOLD DOWN STRIPS 16.GA

DOOR PANEL
DOOR CHANNEL

FORMED CHANNEL

TEK SCREW ARE SCREWED IN PANEL SKIN

**DWG 16-B**
Section M

Installation of Latches and Handles

Step 17. Door Latches

(A) There are mounting plates on the doors for the latches. Install 5/16" x 3/4" bolt and lock washer (see Dwg. 17-A).

(B) The keeper for the latch has 3/8" spacer bolted to it.

(C) Line up the keeper with the latches on doors. Line up keeper with correct spacing and weld spacer solid to door header channel (see Dwg. 17A).

Step 18. Door Handles

(A) Locate handle the height needed and place handle on door channel (14 ga.). Mark holes and drill 5/16" hole (see Dwg. 18-A). In the bag with the handles there are 4 each of 3/8" self threading screws to bolt handles on with. Screw in and the bolts make their own threads.
FIELD WELD 3/8" PLATE

KEEPER

LATCH

DWG 17-A
Section N

Installation of Exhaust Fan & Fan Damper

Step 19. Exhaust Fan

(A) There is a hole in one of the roof panels (see customer drawings for panel number and location).

(B) Set the exhaust fan near this hole.

(C) Attach 6" long section of pipe F4 to 90° EL (F2) with Tek Screws (see Dwg 19-C).

(D) Slip 90° EL with 6" section of pipe inside hole with storm collar (F3) loose on it.

(E) Move fan over and install 90° EL to ring on fan with Tek Screws. This will put fan in correct location.

(F) There are “Z” braces attached to bottom of fan. These braces have ¼" holes. Install Tek Screws in all holes.

(G) Push storm collar down against oven and tighten. Apply bead of oven cement around top and bottom of collar.
Step 20.  Fan Damper

(A)  Install damper inside oven.

(B)  Hold damper cover plate over hole as to completely cover hole and mark each side (see Dwg. 20-B).

(C)  These marks will locate slide brackets.  Put slide brackets just to the outside of line and attach with Tek Screws as shown in Dwg. 20-C.

(D)  Slide damper cover plate into slide brackets after adjusting.  One Tek Screw can be installed later to hold damper cover plate in place.  Start with this damper adjusted to 50%.  The oven pressure will need to be checked at startup and this damper adjusted to have slight negative pressure in the oven.
MARK EACH SIDE
Section O

Installation of Screen Over Return Air Opening

Step 19.   Return Air Screen

(A)   Put expanded metal screen over opening as shown in Dwg. 21-A and attach with Tek Screws.
RETURN AIR SCREEN SCREW IN PLACE

INSIDE OVEN

OVEN WALL

STEP 21-A
Section P

Control Panels

1. Main Control Panel

The main control panel houses a circuit to protect the main power leads, a control transformer, the motor starters and motor protection for the various fans, a flame safety relay, the temperature controller, the high temp limit control, and a PLC. The exterior of the panel has a manufacturers label with the oven serial number. This number is very important. If it becomes necessary to contact Col-Met for parts or customer support, this number will identify the oven so the correct parts or directions can be supplied to match the oven.

2. Remote Control Panel & HMI

Col-Met ovens employ the latest technology PLCs (Programmable Logic Controller) and HMIs (Human Machine Interface). The remote control for the oven comes standard with a 6” HMI. The remote can be placed anywhere on the exterior of the oven or on a nearby wall, 50' max distance. The used of the PLC / HMI combo means that only 6 wires need to be run to the remote. A three conductor shielded cable and three #14 control wires are all that is needed. The shielded cable carries the communication between the PLC and HMI. The control wires bring power to the HMI and return power to the PLC. The power runs to an E-Stop button and then returns to the outputs of the PLC. Pressing the E-Stop kills the ability of the PLC to turn any equipment on and immediately shuts down the oven.

Warning. The PLC does not know that it has been disabled. You must press the HMI Stop before pulling the E-Stop back out. Failing to do so will allow the PLC to instantly turn the oven back on.

3. First Startup

The motors need to be bumped to check for correct fan rotation. Rotation arrows are located on the fan housings. Press the Start/Stop button to change to the main screen. Make sure that all the HMI toggle switches are in the off position. Press the oven start buttons. No fans will run. One at a time toggle the fan switches on and then back off. You will be able to control the fans individually. If the rotation is incorrect remove the power and reverse the fans at the appropriate motor starter. Once the fan rotations have been corrected push the oven Stop button. Toggle all the fans on. Press the oven Start button. The fans will sequence on one at a time to limit inrush current. Observe the legends over the fan toggle switches. When the PLC signals the motor to start, the legend will turn green. When the PLC receives feedback from the fan pressure switch, the legend will turn blue. After the oven has been run and checked out, all that is necessary to start the oven is turn on all the toggles and press the Start button. The oven PLC will take over.

4. Burner Ignition

The HMI should display burner OFF at this point. If you see NO GAS it means that the low gas pressure is tripped. This switch is located on the front of the gas train. It is a square switch with a clear plastic cover and a small RED button in the middle. Press firmly on the
cover and if you have gas pressure, you will feel the click of the reset. The HMI will display OFF if it has reset. When that fans are running and all have flow, the OFF will change to a Hourglass indicating that the oven is purging. The purge timer will countdown. This cycle is timed to allow several air changes in the oven before ignition for safety. (The Purge time is factory set for adequate purge time of specified CFM of exhaust changes per minute. Any tampering with this timer will void the warranty and release Col-Met Spray Booths, Inc. from all related responsibilities.) The Burner toggle can be turned on at any time. The oven will go into ignition mode when the purge cycle is complete. The display will change to a lightning bolt. The ignition trial takes about 30 seconds. Successful ignition is indicated by the lightning bolt changing to a flame. If the oven fails to light the warning buzzer will sound. Press and hold the Reset button for 2 seconds. The buzzer will silence and the oven will attempt to re-ignite. Failure can be caused by air in the gas line. Repeated attempts to ignite will eventually purge the gas line. If you get a strong odor of gas and the oven still will not light, call Col-Met for assistance.

5. Setting the Temp

Press the Main Menu button and then the Set Temps button. There are 2 temp setpoints. The Cure Temp is the temp the oven will come up to initially. The End Batch temp is the temp the oven will switch to at the end of a batch. Press the Temp button you wish to set. A small yellow cursor will flash on the button. Enter the new temp on the keypad and then press Enter. The new temp will appear in the setpoint window. Select the temp you will be using for normal operation. It is normal for a moderate amount of smoke to be generated when the oven heats up for the first time. This is oil being flashed off of the oven metal. It will stop in a few minutes. When it reaches the setpoint temp, locate the 4” inspection window close to the burner in the wall of the burner box. Open the slide gate and hold a piece of paper close to the inspection port. There should be a small draft into the oven. A small negative pressure inside the oven is desirable. A large negative pressure indicates the exhaust damper is open too far and you are wasting heat out the exhaust stack. Positive pressure indicates that the damper is not open far enough. Positive pressure will force hot air between the oven panels and cause the exterior of the oven to heat up. This test must be performed with the oven up to temp. Hot air is thinner. The air flow will change in the oven as it heats up. Do not enter the hot oven to move the exhaust damper. Severe injury to personnel is possible in a very short time. Use a long tool of some type if possible to reach inside the oven. If it is not possible to reach the damper the oven must be shut down and cooled before the adjustment is made.

6. Batch Setup

Batch Time - Press the Main Menu and then press Set Timers. Push the Batch TMR button. There will be a small flashing yellow cursor. Enter the batch time in minutes and tenths of minutes. Press enter and the new time will be entered. Press Main Menu and then Batch Set-Up. There will be 4 choices. This must be done any time power is interrupted to the oven. It will not remember the batch mode when the power is off. Batch Mode 1 – This batch mode will sound a buzzer when the timer reaches zero. Batch Mode 2 – This batch mode will not start the timer until the Cure Temp is reached. Pressing the Batch Start on the start stop screen will let the timer start when the oven is up to temp. When the timer reaches zero, a buzzer will sound and the oven will switch to End Batch temp. This is a good time to change the parts in the oven. While the oven is on the
End Batch temp the oven will not go to high fire when the doors are opened. When the next batch is in the oven and the doors are closed, press the batch stop button. This will switch the oven back to Cure Temp and the oven will recover.

Batch Mode 3 - This mode is used to shut the oven down after the last batch. When the batch start is pressed, the timer will count down. At zero the oven will kill the flame. The fans will continue to run until as the oven cools down until the temp drops to 150 degrees. Then the fans will stop. IMPORTANT: The oven fans should never be shut down at a temp higher than 150 degrees. Doing so can cause the hot fans to sag and get out of balance. The HMI Stop button does not light up until the oven is below 150 degrees for this reason. The Stop button will always stop the oven for safety reasons, but you could damage the fans by doing so.

Batch Mode 4 - This is the single batch mode. The oven will start, light, come up to temp, time itself, turn off the flame, cool down, and stop on its own.

7. Trouble shooting

Most of the indications necessary for troubleshooting can be found on the Start Stop screen. The color of the label above the fan and burner switches is a clue. If the fan is running the label should be blue. If a fan label is still green, that fan has a problem. Gas pressure problems and oven over temp are shown on the HMI graphic.

If the temp controller does not hold the temp correctly, try changing the oven setpoint by one degree. Every time the temp is changed it forces the controller to recalibrate. The controller uses fuzzy logic to monitor the oven response. The longer you run the oven the better the temp controller should get at holding the proper temp.

Input Output screen – The status of the PLC is show on a special window. Press the Main Menu button. Go to Set Timers. Press the Enter Password button. Press the button with the Zero displayed on the upper right. There will be a yellow cursor. Enter the password 1111 on the keypad and press enter. The lower button will change from No to Yes. Press the Main Menu button and then press Set Timer again. You will see a table with all the inputs and outputs to the PLC listed. If the problem still can’t be diagnosed it is time to call Col-Met for assistance.
Section Q

Safety Instructions

1. **Introduction**

   In order to minimize the threat of fires, explosions, personal injury or death associated with an unsafe oven installation, great care must be taken to insure a safe installation. Installers, operators and maintenance personnel must recognize the potential hazards involved and act accordingly. This manual should be read and understood before installing and operating this oven.

   The National Fire Protection Association (NFPA) publishes the most accepted standard for the design, manufacture, installation, maintenance and operation of industrial ovens. All *Col-Met Spray Booths, Inc.* ovens are built to the standards of NFPA 86 (1999 Edition).

2. **Safety Devices**

   This oven was designed with several safety devices used to protect the installation. Do not bypass or disconnect these safety devices during operation. These safety devices include, as a minimum, the following:

   **2.1 Safety Devices for Gas Ovens:**

   Motor Overloads
   Air Proving Switches
   Purge Timers
   Powered Exhaust
   High/Low Gas Pressure Switch
   Combustion Safeguard System

   Guards for Moving Parts
   Explosion Relief Doors/Hatches
   High Limit Switch
   Safety Shutoff Valve
   Proof of Closure Switch

3. **Safe Oven Installation**

   The installation of an industrial oven requires special attention. Proper safety measures protect those installing the oven and those who will operate the oven on a long-term basis. Often, local building and mechanical authorities specify installation requirements. Consult these authorities for any respective instructions.
Only qualified personnel should perform the installation of an oven. "Qualified personnel” typically include contractors or properly trained maintenance personnel. Contractors include:

1. Equipment riggers to unload and handle the oven
2. Electricians to install the electrical wiring and related equipment, and;
3. Mechanical contractors to connect the gas service, air service and exhaust stacks.

4. Starting up the Oven Safely

A safe installation includes a proper startup of the oven prior to allowing operation. Only qualified personnel should conduct the startup procedure for the oven. Qualified personnel include trained maintenance personnel or electricians. Unless specifically trained, oven operators do not usually qualify to start up the oven. Only qualified personnel should enter the control cabinet due to the high voltage involved. Detailed startup procedures are addressed in a separate section of this manual.

5. Operating the Oven Safely

The predominant causes of fires, explosions and personal injury related to industrial ovens are improper use. Inadequate training, lack of maintenance and poor housekeeping. The operator must take an active role in assuring that the workplace is safe. Operators should be thoroughly trained prior to their use of the oven. Their training should include operating instructions and review of the safety issues that immediately follow. Operating instructions are addressed in a separate section of this manual.

1.1 Maximum Solvent Content

This oven is designed to handle a limited amount of solvent per batch. Solvent levels in excess of the maximum allowed may create an explosive atmosphere in the oven. Operators should contact their managers if they do not know what portion of their load is solvent.

1.2 Paper, Wood and other Solid Combustibles

Do not load paper, wood or other solid combustibles without consulting Col-Met Spray Booths, Inc. for appropriate safety measures that must be taken for these processes. There is a danger of fires and explosions resulting in property damage, personal injury or death.

1.3 Maintenance – Periodic and On-demand

The operator has an important role in the proper maintenance of the oven. The operator should shut down the oven and immediately notify management if the odor of gas is present. The operator should immediately notify their supervisor of any changes in operating performance. The operator should NOT restart the oven if a high limit alarm exists. The operator should notify management and insure that the cause of the high limit trip is corrected before the oven is restarted.

1.4 Proper Housekeeping
In maintaining safe oven operation, it is important that proper housekeeping be performed at all times. Allowing varnish to build up in handling carts, for example, contributes to the maximum allowable solvent in the oven and could subsequently cause a fire or explosion. All drippings and combustible products should be cleaned regularly from handling carts and the oven interior. Certain applications cause flammable materials to accumulate in oven exhaust ducts. These items should be inspected and either cleaned or replaced as necessary.

1.5 Explosion Venting Hatches and Doors

Most ovens include explosion relief doors or hatches to allow the oven to vent itself in the case of an explosion. These hatches or doors should not be obstructed. Operators should not stand near these openings.

1.6 Belt Guards

This oven should not be operated if the guards over the moving parts have been removed. When purchased, all ovens include guards secured over all moving parts, i.e., conveyor belts and fan belts. Operators should turn off the oven and notify management if guards are not secured. Guards should be re-secured prior to returning the oven to operation.

1.7 High Voltage

This oven operates on voltages high enough to cause physical injury or death. Only qualified personnel should service the oven or open the control panels or junction boxes.

1.8 Maintain Unobstructed Airflow

In order to maintain a non-explosive atmosphere in the oven, it is important that the circulation and exhaust be unobstructed. Operators should load the oven in a manner that allows adequate air movement in the oven.

6. Periodic Maintenance

Proper maintenance contributes to a safe oven workplace. It is very important that only qualified personnel perform scheduled maintenance on the oven. See the maintenance instructions in a separate section of this manual for recommended maintenance. You may refer to Chapter 10 of NFPA 86 (1999 Edition) for details on required inspection, testing and maintenance. Turn off the power prior to opening control panels and electric boxes. Also, per NFPA 86 (1999 Edition), Section 5-7.2.4, all gas ovens require that safety shutoff valves be leak tested at least once every year.

7. Fire Protection

In accordance with NFPA 86 (1999 Edition), Chapter 11, “Ovens containing or processing sufficient combustible materials to sustain a fire shall be equipped with automatic sprinklers or water spray.” Consult NFPA 86 (1999 Edition), Chapter 11 (Fire Protection) for supporting details. Contact your local fire control specialist for assistance.
8. Manufacturer Support

Don’t hesitate to call Col-Met Spray Booths, Inc. at 972-772-1919 with any questions or needs for field support. Col-Met Spray Booths, Inc. offers factory training for employees, product modifications and upgrades, and product maintenance.

Section R

Startup Instructions

1. Introduction

Only qualified personnel should conduct the startup procedures for an oven. Qualified personnel include trained maintenance personnel or electricians. Operators, unless they have been specially trained, do not qualify to startup the oven. Only qualified personnel should enter the control cabinet due to the high voltage inside. These startup procedures should be followed carefully in order to assure proper installation. Startup supervision services are available from Col-Met Spray Booths, Inc.

2. Checklist for Beginning Startup

A successful startup is dependent upon a proper installation of the oven. A list of conditions should be checked prior to beginning the startup sequence.

1. **Electric Service** – Make sure that the proper three-phase power is connected to the oven.

2. **Exhaust Stack** – Make sure that the exhaust stack is attached to the oven. The airflow should not be obstructed.

3. **Guards** – Make sure that all the guards are secured properly. All moving parts should be protected from exposure in order to prevent possible injury to personnel.

4. **Gas Service** – Ensure that the proper gas pressure and volume are supplied to the oven. As stated in Chapter 3, the inlet gas supply pressure is 5 PSI.

5. **Gas Valves Open** – Verify that all manual gas valves are open.

6. **High/Low Gas Pressure Reset** – Reset the high and low switches on the High/Low Gas Pressure Switches.

7. **Doors Operational** – Verify that the oven doors are operating properly.

2.1 Addition for Ovens with Dry Chemical Fire Suppression System Only

1. **System Activation** – Verify that the fire suppression system has been activated.
3. **Startup Sequence**

Refer to the Control Panels Section.

**Section S**

**Operating Instructions**

**Introduction**

Only trained personnel should operate this oven. This operator must take an active role in assuring that the workplace is safe and free from hazards that could cause personal injury. Every oven operator must be trained prior to operating an oven. This training should include; as a minimum, the safety instructions in the front of this manual and the operating instructions that follow:

**Checklist Prior to Daily Operation**

Operators have an important role in assuring that the oven workplace is safe. Operators must check for several conditions prior to daily operation. Should any safety concerns arise, the oven should not be started and maintenance personnel should be notified immediately. The following checklist should be completed daily:

1. Verify that the control panel cover and all electric box covers are secure.
2. Verify that explosion relief doors and hatches are unobstructed.
3. Verify that no volatiles are near the oven workplace.
4. Verify that all guards are secure over all moving parts.
5. Verify that there is no gas leak detected.
6. Verify that the gas train is in the proper shutdown position. The safety shutoff valve should be closed and there should be no power to the combustion safeguard.
7. Verify that the load in the oven does not contain volatiles in excess of the maximum allowed levels.
8. Start the oven and verify:
   a. The oven purges before starting to heat.
   b. The oven ignites properly.
   c. There is no unusual noise or vibration;
   d. That the oven maintains the control temperature.
Section T

Maintenance Instructions

1. Introduction

Proper maintenance contributes not only to the service life and efficiency of the oven but also to a safe workplace. In addition to performing as-needed repairs to the oven, it is important that qualified personnel perform scheduled maintenance. Qualified personnel include hired contractors and trained maintenance personnel.

2. Scheduled Maintenance

The recommended scheduled maintenance has been broken down into weekly, monthly, semiannual and periodic needs. Outside of the daily checklist addressed in the operation instructions, there is no daily recommended scheduled maintenance for the oven. Operators are instructed to notify their managers if any maintenance concerns arise during daily operation.

2.1 Weekly Checklist

The following items require regular weekly maintenance:

2.1.1 Weekly Maintenance for Gas Ovens

1. Inspect belts for fatigue and proper tension. Replace fatigued belts. Adjust belts if they are squealing or touching the belt guard.

2. Inspect thermocouples and lead wires for shorts or loose connections. Repair or replace as necessary.

3. Check setting and operation of temperature control. Program, adjust or replace as necessary.

4. Test alarms for proper signal. Repair or replace as necessary.

5. Inspect burners for proper flame (see the Eclipse flow diagram). Adjust for proper high fire setting as necessary.

6. Check gas pressure switches for proper settings. The oven, as originally manufactured, was set up for a 5 PSI supply pressure.

7. Inspect all motor valves and control valves for free smooth action. Adjust or replace as necessary.
2.2 Monthly Checklist

The following items require attention on a monthly basis:

1. Check air proving switch settings. Checking switch movements against pressure settings and comparing with actual impulse pressure should test the pressure switch settings.
2. Inspect all electrical components, connections and wiring. Clean, repair or replace as necessary.
3. Test high limit and safety shutoff valves, making sure that the instrument drives in the proper direction. Adjust or replace as necessary.
4. Check ventilation and ductwork systems for cleanliness and flow restrictions. Clean, repair or replace as necessary.
5. Test the main fuel hand valves for operation. Replace as necessary.
6. Inspect burners. Clean or repair as necessary.
7. Inspect all gauges for proper settings. Adjust, repair or replace as necessary.
8. Check ignition cable and transformers for loose connections, cracked ceramic or discoloration. Repair or replace as necessary.
9. Inspect all piping for leaks. Repair or replace as necessary.
10. Clean drippings from carts and floor regularly. Do not allow drippings to accumulate. The leading cause of oven fires is poor housekeeping.
11. Clean ducts and exhaust plenums as necessary.

2.3 Semiannual Checklist

The following items require attention on a semiannual basis:

1. Blow dirt and dust from all blower wheels.
2. Lubricate motor bearings with 30 drops of SAE 20, non-detergent or electric motor oil.
3. Inspect door gasket. Repair or replace as necessary.
4. Inspect exhaust vent stack and recirculation plenums for condensation and accumulation of combustible products. Clean if necessary.
THE HEAT EQUATION

HIGH TEMPERATURE + HIGH HUMIDITY + PHYSICAL WORK = HEAT ILLNESS

When the body is unable to cool itself through sweating, serious heat illnesses may occur. The most severe heat-induced illnesses are heat exhaustion and heat stroke. If actions are not taken to treat heat exhaustion, the illness could progress to heat stroke and possible death.
HEAT EXHAUSTION

What Happens to the Body:
HEADACHES, DIZZINESS/LIGHT HEADEDNESS, WEAKNESS, MOOD CHANGES (irritable, or confused/can’t think straight), FEELING SICK TO YOUR STOMACH, VOMITING/THROWING UP, DECREASED and DARK COLORED URINE, FAINTING/PASSING OUT, and PALE CLAMMY SKIN.

What Should Be Done:
• Move the person to a cool shaded area to rest. Don’t leave the person alone. If the person is dizzy or light headed, lay them on their back and raise their legs about 6-8 inches. If the person is sick to their stomach lay them on their side.
• Loosen and remove any heavy clothing.
• Have the person drink some cool water (a small cup every 15 minutes) if they are not feeling sick to their stomach.
• Try to cool the person by fanning them. Cool the skin with a cool spray mist of water or wet cloth.
• If the person does not feel better in a few minutes call for emergency help (Ambulance or Call 911).

(If heat exhaustion is not treated, the illness may advance to heat stroke.)
HEAT STROKE—A MEDICAL EMERGENCY

What Happens to the Body:
DRY PALE SKIN (no sweating), HOT RED SKIN (looks like a sunburn), MOOD CHANGES (irritable, confused/not making any sense), SEIZURES/FITS, and COLLAPSE/PASSED OUT (will not respond).

What Should Be Done:
• Call for emergency help (Ambulance or Call 911).
• Move the person to a cool shaded area. Don’t leave the person alone. Lay them on their back and if the person is having seizures/fits remove any objects close to them so they won’t strike against them. If the person is sick to their stomach lay them on their side.
• Remove any heavy and outer clothing.
• Have the person drink some cool water (a small cup every 15 minutes) if they are alert enough to drink anything and not feeling sick to their stomach.
• Try to cool the person by fanning them. Cool the skin with a cool spray mist of water, wet cloth, or wet sheet.
• If ice is available, place ice packs under the arm pits and groin area.
How to Protect Workers

• Learn the signs and symptoms of heat-induced illnesses and what to do to help the worker.
• Train the workforce about heat-induced illnesses.
• Perform the heaviest work in the coolest part of the day.
• Slowly build up tolerance to the heat and the work activity (usually takes up to 2 weeks).
• Use the buddy system (work in pairs).
• Drink plenty of cool water (one small cup every 15-20 minutes).
• Wear light, loose-fitting, breathable (like cotton) clothing.
• Take frequent short breaks in cool shaded areas (allow your body to cool down).
• Avoid eating large meals before working in hot environments.
• Avoid caffeine and alcoholic beverages (these beverages make the body lose water and increase the risk for heat illnesses).

Workers Are at Increased Risk When

• They take certain medication (check with your doctor, nurse, or pharmacy and ask if any medicines you are taking affect you when working in hot environments).
• They have had a heat-induced illness in the past.
• They wear personal protective equipment (like respirators or suits).