

**Across-the-Belt** In reference to an area perpendicular to the direction of travel through the furnace; the width of the conveyor belt.

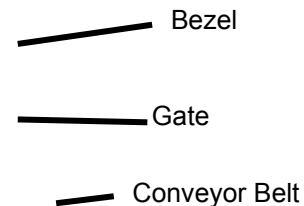
**Actual Temperature** The instantaneous temperature in the furnace as reported by the thermocouple.

**Air-Rake** Long tube set across-the-belt with proportionally spaced small holes.



**Air-Regulator Tubes** Air rakes charged with air or N2 installed in the entrance and exit baffles, used in establishing a controlled atmosphere.

**Blade** Hinged flaps at entrance and exit of furnace that help prevent furnace atmosphere from escaping. See also figure under Drip Trays.



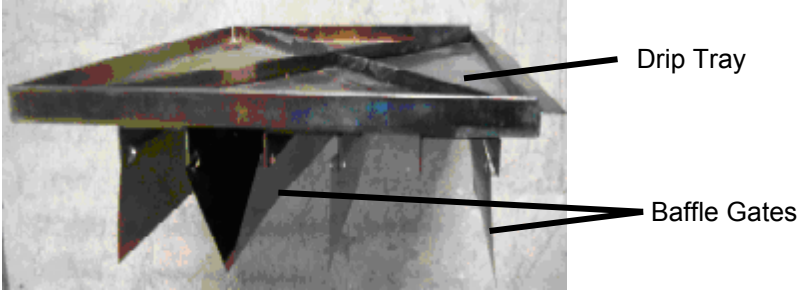
**Bezel** Semi-permanent entrance guard at furnace entrance and exit. See also Gate.



**CDA** Clean dry air – filtered, dry compressed air used as process gas.

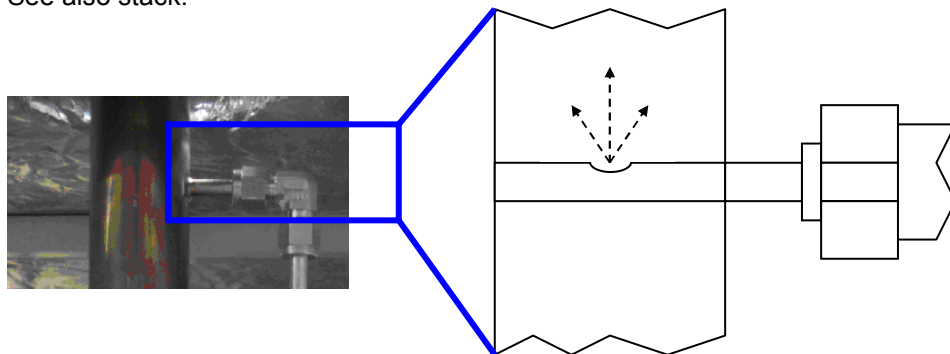
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<b>Chamber</b>	See heating chamber.
<b>Clearance</b>	The distance at furnace entrance between the conveyor belt and the bezel. See diagram under bezel.
<b>Contaminants</b>	Anything present in the process section that could negatively impact product quality including but not limited to O <sub>2</sub> , moisture or particulate matter.
<b>Convection</b>	The process of heating a product via indirect transmission of heat from adjacent high-temperature air.
<b>Controller</b>	Control system that stabilizes temperature, monitors belt speed, alarm conditions and other functions.
<b>Controlled Atmosphere</b>	The atmosphere generated from the process gas, and gas flow patterns within the process section.
<b>Cooling Section</b>	The portion of the furnace that includes the transition tunnel, if any, exit baffle and any additional modules provided for the purpose of cooling the product.
<b>Derivative</b>	The calculated temperature rate of change; used in the PID equation.
<b>Dilution Purge</b>	The continuous process of adding clean gas while exhausting contaminated gas.
<b>Dominant Wavelength</b>	The wavelength of highest occurrence emitted by a radiating element at a specific temperature as described by Wein's Displacement Law.
<b>Drip Trays</b>	Trays positioned beneath stacks with attached baffle gates; used to catch condensation or residue produced by the process. 
<b>Edge Heater</b>	Heaters along edge of chamber used to maintain uniform temperature across-the-belt in a designated part of the heating chamber.

**Eductor**

Metered gas exit used to draw exhaust gas out of the chamber and through the stack. See also stack.



**Effluents**

Contaminants expelled from a product during a thermal process. See also volatiles.

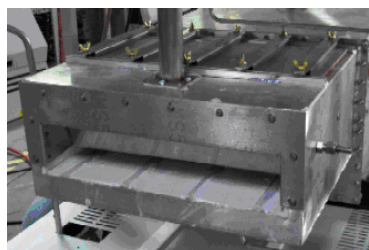
**EMO**

An Emergency off switch.



**Entrance Baffle**

The section at the entrance of the furnace incorporating an air-regulator tube, hanging gates and an exhaust stack; used to establish a controlled atmosphere inside the process section.



**Exhaust Gas**

Spent process gas.


**Error**

Difference between actual temperature and setpoint.

**Flash**

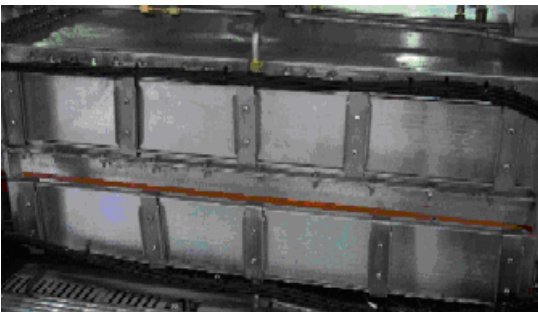
The point at which organic vapors have reached the temperature and concentration necessary for spontaneous combustion.


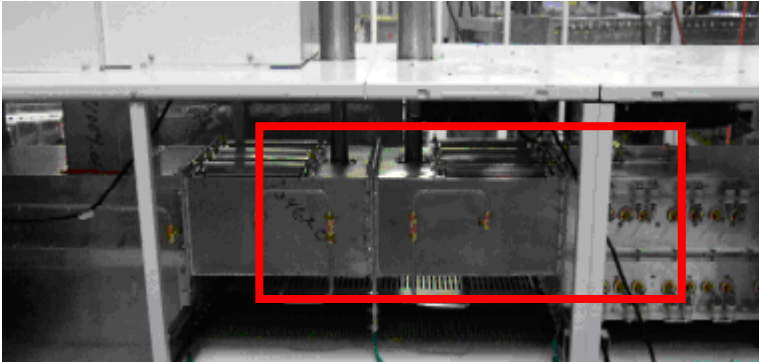
## Appendix

<p><b>Flow Meter</b></p>	<p>A manually adjustable gauge used to control the flow of gas or liquid to the process section.</p>	
<p><b>FG or Forming Gas</b></p>	<p>A type of process gas that consists of any mixture of H<sub>2</sub> and N<sub>2</sub> gasses.</p>	
<p><b>Furnace Length</b></p>	<p>The length of the entire furnace. The sum of the process section and any loading and unloading stations.</p>	
<p><b>Gain</b></p>	<p>Term in PID equation to calculate how far temperature is from setpoint.</p>	
<p><b>Gate</b></p>	<p>Plate that divides furnace into sections that can allow better control of the processing environment. See Blade and Drip Trays for picture.</p>	
<p><b>H<sub>2</sub></b></p>	<p>Hydrogen gas.</p>	
<p><b>Heat Lamp</b></p>	<p>Double ended metal sleeve clear quartz infrared (IR) heat lamp element or emitter.</p>	
<p><b>Heated Length</b></p>	<p>See “Heating Chamber”, next.</p>	
<p><b>Heating Chamber</b></p>	<p>Furnace area where heating takes place. Also referred to as the chamber, or heated length.</p>	
<p><b>Heating Section</b></p>	<p>The portion of the furnace including the entrance baffle and the heating chamber.</p>	
<p><b>Hydrogen Detector</b></p>	<p>Detect hydrogen escaping from furnace.</p>	
<p><b>Integral</b></p>	<p>Mathematical operation that is one term in the PID equation.</p>	
<p><b>Interlocks</b></p>	<p>Switches on some cabinet doors that stop furnace operation and removes power when doors are opened.</p>	
<p><b>IR</b></p>	<p>Electromagnetic wave. Wavelengths between 0.78 and 1000 μm in the electromagnetic spectrum.</p>	

<b>Lamp Strings</b>	<p>A single lamp circuit which may include one lamp, or two or more lamps in series.</p> <p>LA-309 Standard Power furnaces are wired with two lamps per string in zones 1 and 3. Zone 2 is wired with 3 lamps per string at all voltages above 240 Vac*.</p> <p>LA-309 High Power furnaces are wired with two lamps per string in all zones at all voltages above 240 Vac*.</p> <p>*208-240 Vac LA-309 furnaces are wired with one lamp per string in all zones.</p>
<b>LPM</b>	Liters per minute. Units of flow equivalent to 2.119 CFH.
<b>Micron</b>	One millionth of a meter, $1.0 * 10^{-6}$ m, 1.0 $\mu$ m
<b>MMI</b>	Man machine interface software development tool for creating user interface to PLC controller.
<b>Module</b>	A section of the furnace designed for a specific function; may be 15, 30, 45 or 60 inches in length.
<b>N<sub>2</sub></b>	Nitrogen gas.
<b>O<sub>2</sub></b>	Oxygen gas.
<b>Oxygen Analyzer</b>	Detects oxygen content at predetermined locations. Usually installed to read process gas source, and up to three locations in the heating chamber.
<b>Phase Angle Firing</b>	Technique that activates AC power to be applied for only certain times during AC cycle.
<b>PC</b>	Personal computer. The PC provides the main operator interface for operating the furnace. The PC interfaces with the PLC.
<b>PID</b>	Proportional+Integral+Derivative: Three-term closed loop control equation that adjusts power sent to heat lamps. See also Gain, Integral and Derivative.
<b>PLC</b>	Programmable Logic Controller. An industrial computer which provides input and output control of the furnace.
<b>Plenum</b>	Cutout area of chamber insulation where process gas is injected.

## Appendix

<p><b>Plenum Box</b></p>	<p>Pressurized region, enclosing of heat lamps, part of the hermetic seal option.</p>		<p>ends</p>
<p><b>PPM</b></p>	<p>Parts per million. Useful ratio for measuring small amounts of one gas in an area dominated by another.</p>		
<p><b>Process Gas</b></p>	<p>The gas used in creating a controlled atmosphere. Some examples are CDA, N<sub>2</sub>, H<sub>2</sub>, forming gas or other N<sub>2</sub>/H<sub>2</sub> mixtures.</p>		
<p><b>Process Environment</b></p>	<p>The description of the area inside the furnace at any time including the temperature, flow patterns, and the presence or absence of product, process gas, process effluents, or contaminants.</p>		
<p><b>Process Section</b></p>	<p>The physical area inside the furnace from the entrance bezel to the exit bezel. The sum of the heating section and cooling section.</p>		
<p><b>Profile</b></p>	<p>See Temperature Profile.</p>		
<p><b>Proportional Band</b></p>	<p>The temperature range used in the PID equation in applying a portion of the available power to the heat lamps based on the deviation of the actual temperature from the setpoint.</p>		
<p><b>Recipe</b></p>	<p>Instructions, including temperatures and belt speed that the furnace follows.</p>		
<p><b>Resonant Frequency</b></p>	<p>The frequency at which the atomic structure of a material is easily excited into physical vibration resulting in excellent heat transfer characteristics.</p>		
<p><b>SCFH</b></p>	<p>Standard Cubic Foot per Hour. Measurement for gas flow volume. Equivalent to 0.472 standard liters per minute.</p>		
<p><b>SCR</b></p>	<p>Silicon Controlled Rectifier. The electronic device used to regulate power to the heat lamps through signals sent by the PLC controller.</p>		
<p><b>Setpoint</b></p>	<p>The target temperature for a zone.</p>		
<p><b>Sparger Tubes</b></p>	<p>Highly porous, sintered metal tube charged with process gas; typically used in controlled atmosphere cooling modules.</p>		

<p><b>Stack</b></p>	<p>Exhaust stack containing eductor.</p> <p>See also eductor.</p>	
<p><b>STP</b></p>	<p>Standard temperature and pressure: 21.1 C (70 F) 1 Atm, 1.013 Bar (14.7 psig)</p>	
<p><b>Temperature Profile</b></p>	<p>Temperature recorded over a period of time.</p>	
<p><b>Thermal Process</b></p>	<p>The idealized process description for a particular product as it passes through the process section, including the product temperature profile and process environment.</p>	
<p><b>Thermal Process Profile</b></p>	<p>Empirical record of the thermal process</p>	
<p><b>Thermocouple</b></p>	<p>An electronic device that measures temperature.</p>	
<p><b>Throat</b></p>	<p>The throat of the furnace describes the maximum height of any product allowable through the process section.</p>	
<p><b>Transition Tunnel</b></p>	<p>Chamber section between heat and cooling section.</p>	
<p><b>Volatiles</b></p>	<p>Hydrocarbon based product effluents.</p>	
<p><b>With-the-belt</b></p>	<p>In reference to the area of the conveyor belt that extends through the process section.</p>	
<p><b>Zone</b></p>	<p>Area within the chamber where temperature can be independently controlled.</p>	

