

A GUIDE TO SELECTING YOUR INDUSTRIAL OVEN

Application

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The first step in selecting an industrial oven is defining the required heat application that your oven will be used for. Heat processing is extensively used in all types of industries and can range from the common application of baking or curing, to highly customized heat treatments that specifically meet the demands of a unique product. Common applications for industrial ovens include:

- Aging
- Annealing
- Baking
- Bonding
- Curing
- Drying
- Homogenizing
- Normalizing
- Pre-Heating
- Tempering
- Sterilization
- Stress Relieving

Regardless of whether you require a conventional or a more specialized treatment, the defining of your application is a fundamental component in selecting your industrial oven.



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Process Type

When choosing an industrial oven, it is essential to determine what type of process method is best suited for your particular production needs. Key considerations to make this determination include: the product material type, the quantity of products being processed, the uniformity in size and shape of the product, and the allowable temperature range and tolerances.

Batch Process Ovens

Batch ovens are best suited for applications in which the product size, production volume, dwell time, and thermal requirements vary significantly. LEWCO offers batch ovens in both walk-in and cabinet oven configurations. Walk-in ovens are best suited for processing large parts or parts on carts or racks. The cabinet oven, a smaller fully assembled batch oven, is best suited for processing small parts, commonly placed on shelves.

Continuous Process Conveyor Ovens

In situations where large quantities of similar parts are being processed, conveyor ovens are the ideal solution. As the name suggests, conveyor ovens transfer, or convey, and allow uniform heating among products. Oven systems with integrated material handling allow for customized process heating capabilities that can be directly incorporated into a manufacturing process to increase production efficiency. A variety of pre-engineered, standard conveyor designs, including belt, roller, chain & slat, as well as overhead conveyor, allow LEWCO to provide a solution to suit almost any continuous oven application.

Required Dimensions?

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Your industrial oven dimensions are dependent on the size of your product, the production volume for each batch, and the number of batches needed each day to meet your necessary requirements. Having an internal space that is undersized for your process will result in production inefficiencies and may create a bottle-neck. While an oversized oven will most likely accomplish your process heating needs, it often leads to unnecessary wasted resources.

LEWCO offers over 1,200 standard model ovens that are available in work-space volumes from 8 to 2,400 cubic feet. Whether your required dimensions are large or small, LEWCO can provide an oven to help maximize your efficiency.

Note: Your internal oven dimensions should be slightly larger than your parts in order to provide adequate airflow.

4 Temperature Requirements?

When establishing the temperature requirements for your industrial oven it is necessary to ask the following questions:

- Is there a known controlled or critical temperature the product must reach?
- Is there a controlled rate or critical time requirement to bring the product up to temperature?
- Is there a required dwell time that the product must be subject to?
- Does the process require a controlled cooling cycle?

LEWCO batch ovens are available in temperature ranges of 350°F, 500°F, 650°F, 800°F, 1,000°F and 1,200°F.



Temperature Uniformity

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Temperature uniformity is known as the overall temperature variation in the oven workspace. Tight oven uniformities ensure that all parts within the qualified zone are exposed to the same temperature for consistent product quality. Factors that affect uniformity include heat loss through oven walls and openings, air distribution and the volume of airflow, control accuracy, and construction techniques.

LEWCO's Enhanced Duty Batch Ovens guarantee a temperature uniformity of +/- 10°F. up to the maximum operating temperature. An AMS2750-E certified temperature uniformity survey is completed on every enhanced duty oven prior to shipment.

Determining the source of heat for your industrial oven may not always be evident. While both heating mediums provide their own advantages, it is important to know which is best for your application. Factors that influence this decision include the utilities available at your facility, the sensitivity of the product being heated, and both your purchasing and operating budget.

Electric Heat

Electrically heated ovens are the most cost-effective solution for ovens with smaller workspaces. They're also a good choice for curing applications that don't allow contamination from products of combustion in the workspace. Additionally, electric ovens are usually easier to service and maintain compared to fuel-fired ovens. Other major benefits of LEWCO electric ovens include:

- Low watt density Incoloy® heaters with brass jumpers provide years of trouble free service.
- Standard heater bank assemblies are installed in high velocity ductwork to maximize heat transfer.
- Removable cover plates create easy access for maintenance and service.
- Does not require an exhaust fan for NFPA 86 Class B Ovens

Natural Gas

Fuel-fired ovens are the most cost-effective solution for ovens with larger workspaces. They're also generally much less expensive to operate compared to electric ovens of similar large size. Other advantages include the ability to heat to higher temperatures at faster rates than electric ovens; making it a good choice when your product must reach a high temperature in a short period of time. Additional benefits of LEWCO gas ovens include:

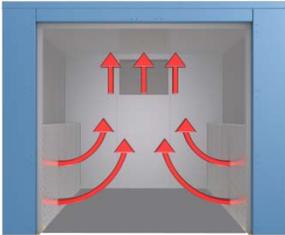
- High turndown ratio allows rapid heat-up and tight temperature control over a wide range of operating temperatures.
- Low CO and NOx emissions relative to similar burners.
- Factory Mutual (FM) compliant fuel train.



Airflow Pattern Options

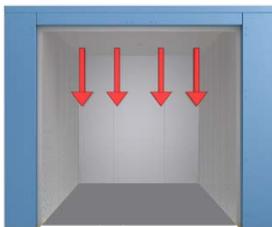
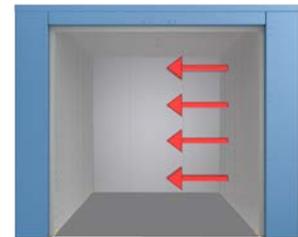
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When selecting an airflow pattern, the most important consideration is the load configuration. The main objective is to minimize airflow obstructions for more uniform heat distribution and to maximize the product surface area coming into contact with the airflow.



Dual Airflow: Hot air is supplied from both side walls and returned through a top plenum. This is the most versatile and common airflow configuration for batch ovens. However, the configuration of the parts being heated must be considered. There must be adequate space around the parts or openings through the parts to permit air to flow to the top return plenum.

Horizontal Airflow: Hot air is supplied from one side wall and pulled across horizontally to the opposite side wall. Horizontal airflow is selected when the parts being heated are loaded on multiple shelves. This is also a good selection if you're trying to pull the air directly through a part, such as cylinders, pipes, tubes, etc.



Vertical Down Airflow: Hot air is supplied from a ceiling plenum and pulled down to a floor plenum. Vertical down airflow is standard in LEWCO conveyor ovens, however, dual and horizontal airflow patterns are also available. This is ideal airflow for a single layer of flat parts being process on a conveyor.

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Oven Construction

A well-constructed oven provides efficient operation with minimized heat loss to the operating environment. When selecting your industrial oven, some important construction characteristics to look for include:

- Heavy gauge steel exterior, finished with a scratch resistant paint
- Adequate insulation to minimize heat loss
- Industry standard, reliable and applicable controls
- Heavy-duty door system that won't warp and provides a tight seal



Door Seals

The type of door seal required is determined by maximum oven temperature, the atmospheric conditions within the process chamber, the size of the door opening, and the door style. Common door gasket materials are silicon rubber, fiberglass and ceramic fiber. Expansion joints allow the door(s) to maintain a consistent seal throughout the heat cycle.

Heater Box Positioning

LEWCO Standard batch ovens are offered with either top or rear mounted heater boxes. Top mounted heater boxes create a smaller foot print and permit pass-through processing. Rear mounted heater boxes are ideal for installations with height restrictions.



Control Options

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LEWCO's standard control package includes a single set-point process temperature controller and redundant high-limit controller. Circulation fan(s) and exhaust fan(s) include air proving circuits that are electrically interlocked with the heating circuit. All controls are housed in a NEMA 12 enclosure employing a full voltage lockable disconnect switch. Additional control options can include:

- **Door Switch:** Disables heat when door is opened on electrically heated ovens; holds burner at low fire on fuel-fired ovens.
- **Batch Timer:** Can be set to automatically turn-off heat, or sound alarm at batch completion.
- **Ramp/ Soak Controller:** Allows operators to create and store multiple ramp/soak recipes.
- **Data Logger/ Chart Recorder:** Can be used to monitor/record any analogue data, such as process temperature, part temperature, vacuum pressure, etc.
- **Zero Speed Switch for Fans:** Used for fan proving circuit in place of standard differential pressure switches. The zero speed switch detects the fan rotation and is not affected by varying ambient pressure conditions. This is required for ovens operating at, or above, 800°F.
- **Composite Curing Controls:** Custom written PLC/HMI control packages with thermocouple jacks, and vacuum ports & pump.



10 Special Requirements?

NFPA Class A & B:

The National Fire Protection Association's standard, NFPA 86, documents the guidelines for the safe operation of industrial ovens and furnaces. All LEWCO Ovens are designed and manufactured to meet the requirements of this standard.

Ovens and furnaces in which flammable volatiles or combustible materials are present in the work space are classified by NFPA 86 as "**Class A.**" Similarly, ovens and furnaces in which no flammable volatiles or combustible materials are present are considered "**Class B.**" Due to the risk of fire or explosion, NFPA 86 requires specific safety equipment for all Class A ovens and furnaces. In addition, fuel-fired ovens and furnaces also require safety equipment that includes a powered exhaust fan and an explosion relief area.

Inert Atmospheres:

A process that requires a low oxygen concentration in the oven to prevent oxidation on parts would utilize an inert atmosphere. Inert gas is injected into a sealed chamber, pressurizing the oven and replacing the oxygen. Specialty gases such as argon or nitrogen are often used to limit oxygen levels to below 50 parts per million (PPM). Atmospheric ovens require sophisticated construction techniques, high integrity welds, special fabrication methods and special motor shaft seals. Special controls are also required to insure the atmosphere remains inert during the entire heating cycle.

Humidity:

Humidity is often used to control moisture removal rates and to speed the curing of certain compounds. Moisture is added in two ways: 1) steam is directly injected into the oven, or 2) water can be sprayed through atomizers into the oven to maintain a specified humidity level. High-humidity ovens are constructed with stainless steel interiors and have continuously back welded seams to prevent rusting and migration of moisture into the insulation. In contrast, some curing/drying applications require dehumidification to limit the amount of moisture in the oven.

Talk to the Experts!

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While our product lines are world-class quality and competitively priced, LEWCO's strength is our ability to understand customer's applications.

Our Applications Engineers are more than happy to speak with you regarding your process heating needs! Please give us a call at (419) 502-2780, or send us an email at ovensales@lewcoinc.com.

Make sure to check out LEWCO's new **Product Configurator** also! LEWCO's Product Configurator walks customers through their specific requirements in a clear, step by step process, allowing them to select various available options and providing detailed product information. When finished, the configurator will automatically generate a detailed spec sheet for the customer to save or print.

