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BENCH & LAB OVENS, INCUBATORS & WARMERS **BUYER'S GUIDE**



Bench Ovens

High-temperature applications



Lab Ovens

General Laboratory Heating



Incubators

Low-temperature / Biological Applications



Warmers

Gentle Product Heating



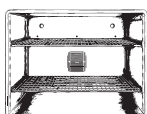
Precision-engineered thermal solutions for laboratories, healthcare and industrial applications

A Practical Guide to Choosing Laboratory Ovens, Incubators, & Warmers

INSIDE THIS GUIDE, YOU'LL LEARN ABOUT

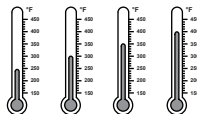
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Heating Chambers



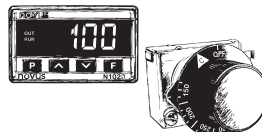
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Temperature Range



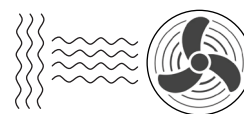
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Controls



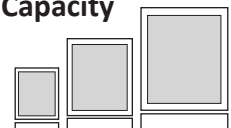
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Convection Methods

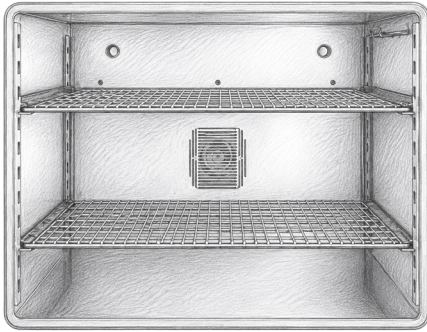


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Capacity



Heating Chambers



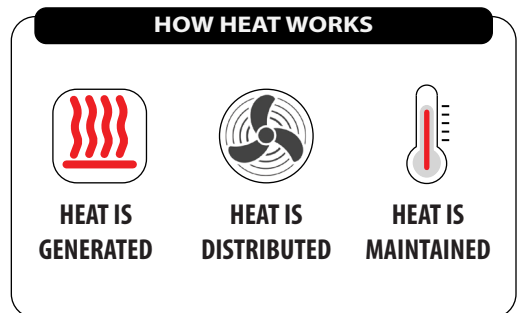
The heating chamber is the heart of any incubator and oven—where controlled heat is applied to your product or material. Its design directly impacts how evenly and accurately temperature is maintained. Consistent airflow and proper heat distribution help ensure reliable, repeatable results, while insulation supports stable conditions and efficient operation.

How Heat Works Inside a Chamber

At its core, heating is about transferring energy. In a heating chamber, this process is carefully controlled to ensure consistent and repeatable results.

Heat is generated by internal elements and transferred into the air and surrounding surfaces. As the air warms, it begins to circulate throughout the chamber—either naturally or with the help of a fan—carrying heat to all areas.

The goal is not just to reach a set temperature, but to ensure that every point inside the chamber reaches and maintains that temperature evenly. This balance of heat generation, airflow, and retention creates a stable and uniform heating environment ensuring consistent results for your application.



Key Factors in Chamber Performance

Chamber heating performance depends on several design and airflow factors working together to maintain temperature stability, uniformity, and efficient heat transfer. Understanding how heat is generated, distributed, and retained helps improve consistency, recovery time, and overall system reliability across laboratory and industrial applications. When comparing chamber designs, these key factors directly affect temperature uniformity, recovery, efficiency, and overall performance:

- **Heating Element Placement**

The position and layout of heating elements determine how heat enters the chamber. Well-placed elements help distribute heat evenly, reducing hot and cold spots, and improving overall uniformity.

- **Airflow & Circulation**

Air movement is critical for carrying heat to every part of the chamber. Consistent circulation improves temperature uniformity and speeds up recovery after the door is opened.

- **Chamber Construction**

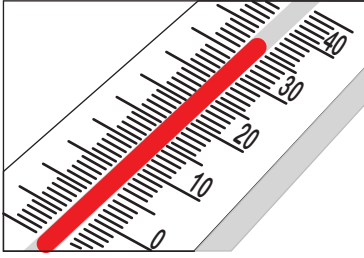
The materials and internal design affect how heat is absorbed, reflected, and retained. A well-built chamber supports consistent performance and durability under repeated heating cycles.

- **Insulation**

Effective insulation minimizes heat loss, maintains stable internal temperatures, and improves energy efficiency. It also helps keep the exterior cooler and safer to operate.

Understanding these key chamber design factors provides the foundation for evaluating temperature performance characteristics such as uniformity, stability, accuracy, and recovery, as well as the operating conditions and design variables that affect overall temperature performance.

Temperature - How it's Measured and Why it Matters



Temperature inside a chamber is measured using sensors such as thermocouples or RTDs that monitor the air temperature within the chamber. These measurements help determine how consistently heat is maintained throughout the heating process.

Why Temperature Measurement Matters

Accurate temperature measurement affects product quality, process consistency, repeatability, and safety. Even small temperature variations can impact drying, curing, aging, testing, and other thermal processes.

Understanding how temperature is measured also helps explain key performance terms when comparing equipment:

- **Uniformity** – temperature consistency throughout the chamber
- **Stability** – ability to maintain temperature over time
- **Accuracy** – how close the measured temperature is to the actual temperature
- **Recovery** – how quickly the chamber returns to temperature after door openings or loading

These factors play a critical role in chamber performance and will be discussed in more detail throughout the remainder of this guide.

What Affects the Temperature Performance

Temperature performance inside a chamber is influenced by several factors that affect uniformity, stability, accuracy, and recovery. Understanding how these variables interact helps ensure the right unit is selected for the application.

► CHAMBER SIZE AND VOLUME

Chamber size directly influences heating consistency and recovery time. Smaller chambers typically heat and recover faster, while larger chambers require greater airflow and circulation to maintain uniform heating.

- Larger chambers may experience greater temperature variation
- Overloading chambers can reduce performance
- Proper chamber sizing improves efficiency and consistency

► CONVECTION METHOD

Convection determines how heated air moves throughout the chamber and plays a major role in temperature uniformity and recovery speed.

- Gravity convection uses natural airflow for gentle heating
- Mechanical convection uses fan-forced airflow for faster, more uniform heating
- The proper convection method improves process consistency and performance

► AIR FLOW PATTERNS

Airflow patterns determine how heat is distributed throughout the chamber. Proper airflow helps maintain consistent temperatures across shelves and product loads.

- Horizontal airflow supports even shelf-to-shelf heating
- Vertical airflow promotes top-to-bottom circulation
- Restricted airflow may create uneven heating zones

► SHELVES AND PRODUCT LOADING

Shelf placement and product loading can significantly influence airflow and temperature consistency inside the chamber

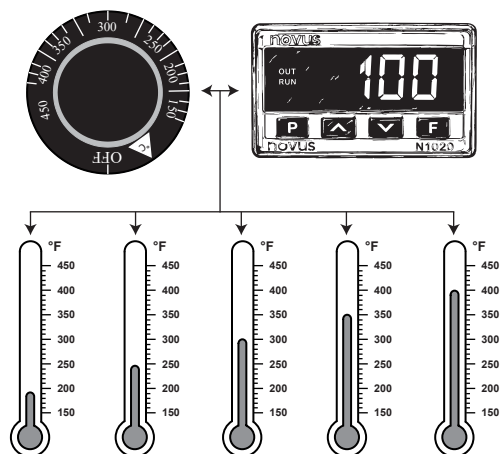
- Overloaded shelves may block airflow and reduce uniformity
- Proper spacing improves circulation and recovery
- Larger product loads may increase recovery time

► ENVIRONMENTAL CONDITIONS

The surrounding environment can also influence chamber performance and stability.

- Room temperature fluctuations may affect operation
- HVAC airflow and nearby equipment can influence heating consistency
- Stable environments help maintain reliable chamber performance

How is Temperature Controlled

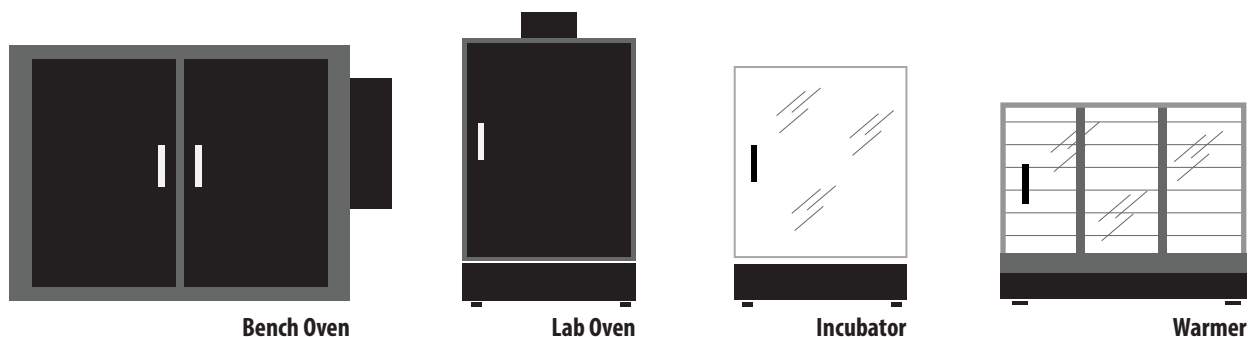


The temperature inside a chamber is controlled using either a thermostat or a PID controller to maintain the desired heat level. A thermostat turns the heater on and off as the temperature changes, while a PID controller makes small adjustments to keep the temperature more stable and accurate. Good temperature control is important because it helps provide consistent results, protects products from overheating, and ensures reliable performance during testing or processing.

What This Means for Your Process:

- Thermostat control provides simple, reliable heating by cycling the heater on and off
- PID digital control continuously adjusts heat for improved accuracy and stability
- Reduces temperature swings, overheating, and inconsistent results
- Helps ensure repeatable testing, processing, and product quality

Why All This Matters When Choosing Equipment



When it comes to selecting the right thermal equipment for your application, four key criteria will guide you to the right choice — whether you need a Bench Oven, Lab Oven, Incubator, or Warmer from our lineup. Selecting the right unit means getting the right fit the first time: a unit that performs reliably from day one. This saves you guesswork, reduces back-and-forth communication, and avoids the cost of returning equipment that doesn't fit your needs.

4 SELECTION CRITERIA:

- 1— **Temperature Range**
- 2— **Controls**
- 3— **Convection Methods**
- 4— **Capacity**

PRODUCT SPECIFICATION SHEETS

Select a product category below or scan the QR code to access full sales sheets, specifications, and options.

- *Bench Oven Series*
- *Lab Oven Series*

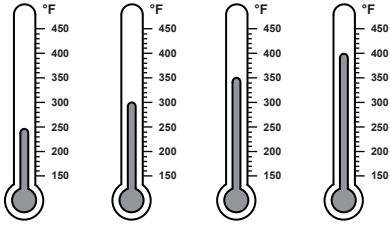
- *Incubator Series*
- *Warmers*



<https://quincylab.com/sales-brochures>

While each criterion is important on its own, the best equipment selection comes from understanding how temperature range, controls, convection method, and capacity work together to support your process. The sections that follow briefly explain each criterion and help you identify the best product for your application.

Temperature Range



Temperature range refers to the minimum and maximum temperatures a warmer, incubator, or oven can achieve and maintain. Warmers operate from a preset temperature above ambient (room) temperature up to their maximum rated limit, while incubators and ovens operate from above ambient temperature up to their maximum rated limit.

Selecting the correct temperature range ensures your process reaches and maintains the required temperature efficiently and consistently.

Why Temperature Range Matters

Choosing the right temperature range isn't just a specification—it determines how accurately your process runs, how consistent your results are, and whether the equipment is truly suited for your application.

Each unit is designed for a specific temperature range and use:

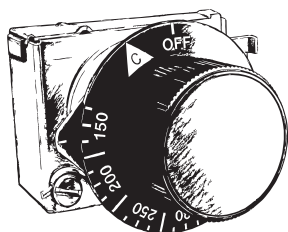
Product	Temperature Range	Typical Uses
Bench Oven	Up to 300°F, 450°F, or 550°F (depending on model)	Industrial heating, curing, baking
Lab Oven	Ambient +25°F to 450°F; LT models: Ambient +15°F up to 225°F	Drying, testing, aging, sterilizing
Incubator	Ambient +2°C to 62°C; up to 93°C on select models	Cultures, biological applications
Warmer	100 - 125°F	Warming wipes and related products

Making the Right Choice - Selecting the right temperature range ensures your application can reach and maintain the required temperature while delivering consistent and repeatable results. Operating within the intended range allows for tighter control and more stable performance, while avoiding unnecessary strain on the equipment. Using an oven beyond its designed limits can reduce efficiency and shorten its lifespan. When properly matched to the application, the oven provides more uniform heating and reliable operation over time.

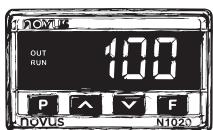
Considerations When Selecting Temperature Range

- What temperature range does your process require?**
 Identify the minimum and maximum temperatures required for your application.
- Would selecting a slightly higher maximum temperature benefit your process?**
 Selecting a model with additional temperature capacity can provide flexibility and help maintain performance without operating at its maximum limit.
- Is the equipment matched to your application type?**
 Warmers and incubators are suited for lower-temperature applications, while lab and bench ovens are designed for higher-temperature processes.
- Will your application needs change over time?**
 Selecting a slightly broader temperature range can provide flexibility for future requirements.

Controls



Analog Controller



Digital Controller



**Advanced
Digital Controller**

A temperature controller regulates and maintains the desired temperature inside the unit by measuring the current temperature, comparing it to the set-point, and adjusting heat output accordingly. The level of temperature accuracy, stability, and uniformity depends on the type of controller used.

The difference is in precision and method:

- **Analog controllers** regulate temperature mechanically in a simpler way, which can result in wider temperature swings.
- **Digital controllers** continuously monitor and adjust temperature more precisely, reducing fluctuation and improving consistency.
- **Advanced digital controllers** provide tighter temperature control, improved stability, and better repeatability for precision applications, while also offering advanced features such as timer functions and ramp/soak programming for controlled multi-step heating processes.

TEMPERATURE ACCURACY

Temperature accuracy refers to how close the actual chamber temperature is to the set-point temperature.

In our incubators and ovens, accuracy is measured at the center of the chamber — the most stable location — helping ensure the desired temperature is maintained where it matters most. High accuracy is important for applications requiring precise and repeatable results.

TEMPERATURE STABILITY

Temperature stability refers to how much the temperature fluctuates over time at a single location after the unit reaches the set-point.

It is typically expressed as a $\pm$ degree variation and indicates how tightly the oven, warmer, or incubator maintains temperature. Good stability is important for accurate testing, repeatable results, reliable incubation conditions, and consistent product quality.

TEMPERATURE UNIFORMITY

Temperature uniformity describes how evenly heat is distributed throughout the chamber at a specific point in time.

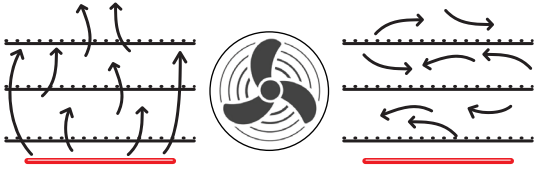
Good uniformity minimizes temperature variation between different areas inside the chamber, helping ensure all samples or products receive consistent heating conditions.

Uniformity is especially important for testing, drying, curing, and processing multiple items simultaneously.

Considerations When Selecting Type of Controller

- **How precise does your temperature control need to be?**
Applications requiring tight temperature control and repeatable results typically benefit from digital PID controllers.
- **Will temperature fluctuations affect your process or product quality?**
Processes sensitive to temperature swings may require a more advanced controller with improved stability.
- **Do you need advanced control features?**
Analog controllers offer basic operation, while advanced digital controllers can provide timers, alarms, ramp/soak programming, and communication options.
- **How important are accuracy and repeatability for your application?**
Precision testing, curing, incubation, and laboratory processes often require tighter control than general heating applications.
- **How important is ease of use in your application?**
Choosing a more capable controller now can provide flexibility for future applications and process upgrades.

Convection Methods



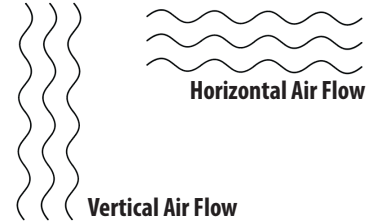
The Ideal Oven Airflow

Heat is distributed throughout an oven, incubator, or warmer using either **gravity convection (natural airflow)** or **air-forced convection (forced airflow)**, which can be either vertical or horizontal. Each has its own characteristics that affect temperature uniformity, heat transfer speed, drying performance, and recovery time.

AIRFLOW PATTERNS (FORCED AIRFLOW)

Air-Forced systems use fans to circulate heated air throughout the chamber, helping maintain more consistent temperatures across samples.

Quincy Lab air-forced ovens and incubators are available with either **vertical airflow** or **horizontal airflow** patterns depending on the application.



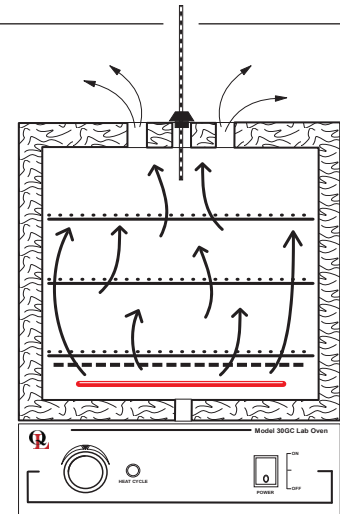
► GRAVITY CONVECTION (NATURAL AIRFLOW)

Gravity convection ovens rely on naturally rising warm air to create gentle airflow circulation inside the chamber. Because airflow movement is non-mechanical and low turbulence, these ovens are ideal for applications where stronger airflow could disturb lightweight or delicate samples.

Common applications include baking, drying, conditioning, preheating, aging, and curing.

Typical Gravity Convection Characteristics:

- Gentle airflow which reduces sample disturbance
- Lower risk of dehydration
- Reduced sample embrittlement
- Quiet operation
- Budget friendly



► AIR-FORCED CONVECTION (VERTICAL AIRFLOW)

Air-forced convection ovens use a circulation fan to continuously move heated air throughout the chamber. This convection process transfers heat by forcing warm air across the product surface, allowing heat to move more efficiently and uniformly compared to gravity convection units.

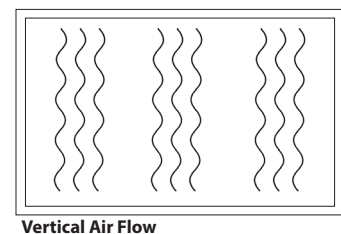
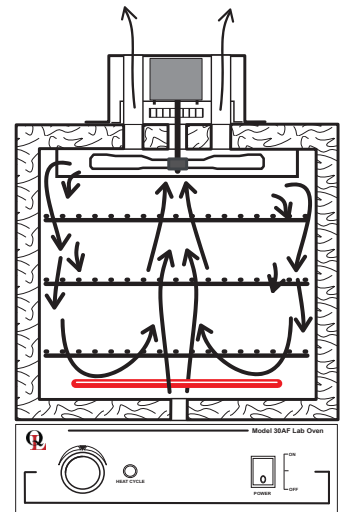
Vertical airflow units direct heated air upward from the bottom of the chamber and through the workload. The controlled airflow pattern reduces temperature variation while providing gentle, even heating around the product.

Because heated air is constantly recirculated, the system also improves temperature recovery after door openings and facilitate moisture removal during drying applications

Common applications include drying, sterilization, electronic burn-in, asphalt testing, epoxy curing, and other processes requiring faster heat recovery and precise temperature control.

Typical Air-Forced Convection Characteristics:

- Circulation fan increases uniformity
- Continuous air flow facilitates dehydration and moisture removal
- Less restrictive chamber loading requirements
- Improved recovery times
- Efficient heat transfer across shelves



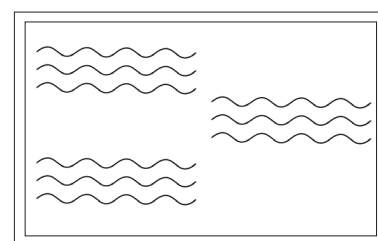
► **AIR-FORCED CONVECTION (HORIZONTAL AIRFLOW)**

Horizontal airflow systems direct heated air across the chamber from the side walls or rear plenum toward the opposite side, creating consistent cross-airflow across shelves and product surfaces. Compared to vertical airflow systems that move air upward through the workload, horizontal airflow provides more direct lateral heat transfer across densely loaded shelves and trays.

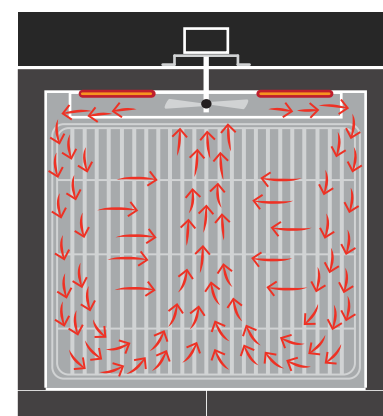
Depending on the unit's design, horizontal airflow systems operate with heating elements located in the rear wall (Bench Ovens) or at the bottom of the chamber floor (AE Incubators) through the process of gravity convection, allowing heated air to be efficiently circulated and redistributed throughout the workspace.

Rear-wall Heating Design Benefits

In some horizontal airflow ovens, the heating elements are integrated into the rear wall plenum behind the circulation fan. This design allows air to be evenly heated as it enters the chamber, helping deliver highly uniform airflow and temperature distribution across all shelf levels.



Horizontal Air Flow



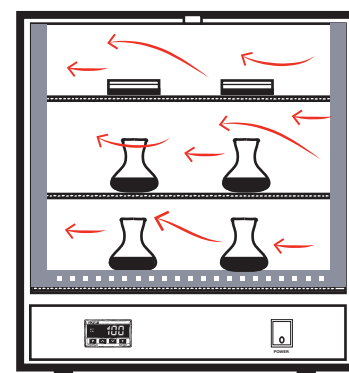
Top Down View - Bench Oven

Bottom-heated Design Benefits

Horizontal airflow systems with bottom-mounted heating elements and sidewall air circulation combine radiant and forced-air heating to maintain chamber temperature, even during airflow interruptions. In this design, heated air is circulated through sidewall ducts while the bottom heating system continues supplying thermal energy to the chamber.

Typical Air-Forced Convection Characteristics:

- Circulation fan increases uniformity
- Continued heat generation if airflow is temporarily reduced
- Gentle supplemental radiant heating from below
- Efficient airflow circulation across shelves and product surfaces
- Reliable temperature recovery and drying performance



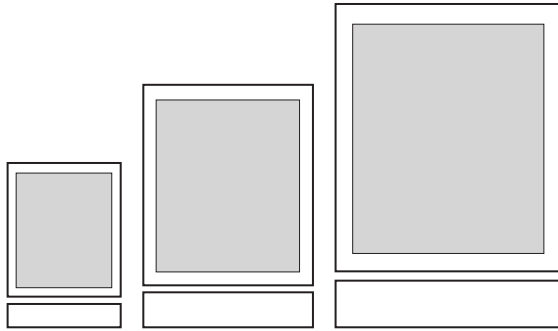
Front View - AE Incubator

Considerations When Selecting Convection Type and Air Flow

- **Will strong airflow affect your product or samples?**
Lightweight, powder-based, or delicate materials may require gentler airflow to prevent disturbance during processing.
- **How important is temperature uniformity throughout the chamber?**
Applications requiring consistent temperatures across multiple shelves or samples often benefit from forced-air circulation.
- **Do you need faster heat-up and recovery times?**
Forced-air systems typically provide quicker heating and faster temperature recovery after door openings or product loading, to facilitate increased batch processing.
- **What type of process are you performing?**
Drying, curing, and high-throughput applications often benefit from forced airflow, while incubation or sensitive heating applications may perform better with gravity convection.

Capacity - The Ideal Chamber Size

Choosing the Right Capacity for Your Application Bigger is not always better.



Selecting the correct chamber size is important for temperature performance, workflow efficiency, and operating cost. Oversized chambers can waste energy heating unused space and may increase heat-up and recovery times, while undersized chambers can limit sample capacity and restrict airflow around products.

The ideal chamber should provide enough usable space for your application while maintaining proper airflow, temperature uniformity, and efficient operation.

Your oven or incubator must fit comfortably within your available installation space and allow proper clearance for ventilation and operation.

- **If your chamber is too small**, workflow efficiency and sample capacity may be limited.
- **If your chamber is too large**, you may waste valuable lab space and increase operating costs by heating unused volume.

All Quincy Lab chambers are designed to support adjustable shelf configurations for improved flexibility and chamber organization. Make sure your selected unit can support the number of shelves and sample spacing your application requires and be sure to consider:

- Floor or bench space availability
- Doorway and hallway clearances during installation
- Access space for loading, unloading, and maintenance
- Ventilation and clearance requirements
- If space is not limited, larger chamber capacities may improve throughput and workflow efficiency.

All Quincy Lab incubators, lab ovens, and bench ovens are designed as benchtop units. You can also pair our bench ovens with optional stands or cabinets for additional flexibility.

Considerations When Selecting Type of Heating Method

- **What size and quantity of samples will you process?**
Make sure the chamber can accommodate your products while maintaining proper airflow around the load.
- **Are you selecting the proper chamber size?**
Oversized chambers may waste valuable lab space while overloading a smaller chamber may affect overall performance. *As a rule of thumb, maintain 2 inches of airspace from all interior walls.*
- **Does your available workspace support the unit size?**
Consider floor or bench space, doorway clearances, ventilation requirements, and maintenance access.
- **Would a Lab Oven or Bench Oven unit work best for your application?**
Benchtop units maximize workspace efficiency, while larger chambers support higher-capacity processing. The Bench Oven's horizontal airflow allow for larger workloads and increased uniformity.
- **Could your application requirements change in the future?**
Selecting a chamber with slightly more usable capacity can provide flexibility for future growth and additional sample volume.

WHY QUINCY LAB

Reliable Thermal Solutions Designed Around Real Applications

Selecting the right oven, incubator, or warmer is about more than simply reaching a temperature set-point. Long-term reliability, consistent performance, practical controls, and dependable support all play a critical role in achieving repeatable results and protecting your process.

For decades, Quincy Lab has focused on designing thermal equipment that delivers dependable performance for laboratory, healthcare, industrial, and testing applications.

Our approach is simple:

Provide reliable, practical, and cost-effective thermal solutions backed by knowledgeable customer support.

WHAT MAKES QUINCY LAB DIFFERENT

RELIABLE PERFORMANCE

Quincy Lab products are engineered to provide:

- Long service life with minimal maintenance
- Consistent temperature performance
- Reliable airflow circulation
- Stable heat recovery
- Durable day-to-day operation



From drying and curing to incubation and testing, our chambers are designed to support repeatable process results across a wide range of applications.

ENGINEERED FOR REAL-WORLD APPLICATIONS

Quincy ovens, incubators, and warmers are designed around real process requirements including:

- Drying & curing
- Biological incubation
- Product warming
- Testing & conditioning
- Industrial heating applications

Available convection systems, chamber sizes, and control options allow customers to select the right solution for their process needs.

EXCELLENT CUSTOMER SUPPORT

Selecting thermal equipment is an important investment, and application requirements can vary significantly.

Quincy Lab is committed to providing responsive customer support and application guidance to help customers:

- Select the right unit
- Understand airflow and temperature requirements
- Identify appropriate control options
- Support long-term operation and performance

Our goal is to provide practical solutions and dependable continued support.

DESIGNED TO SUPPORT YOUR PROCESS

Quincy Lab thermal solutions are designed to deliver reliable performance, efficient operation, and long-term value across a wide range of laboratory and industrial applications. Whether your process requires gentle warming, precise incubation, laboratory heating, or industrial thermal processing, Quincy Lab provides dependable solutions and knowledgeable support designed to help customers operate with confidence.