



Design and Construction of Brewery Quality Labs



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Engineering Technical Subcommittee

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PURPOSE

The purpose of this document is to provide brewers, laboratory personnel and engineers basic guidelines to consider when designing and constructing a laboratory for a new or existing brewery.

Brewery labs do not have to be complex, but it is important understand the implications of material, site, and equipment selection.

GENERAL DESIGN CONSIDERATIONS

When planning the design of a brewery laboratory, start by identifying the purpose and function of your lab.

- What analysis will be performed?
- What equipment will be used?
- Will the lab have a dedicated employee?
- Does the lab require a work station and computers?
- Will samples be stored or retained in the lab?
- Will sensory analysis be performed in the lab?

Once the basic scope has been determined, outline more specific requirements:

- Determine the dimensions of the tools and instruments to be utilized. (Don't forget about the height, and dimensions of doorways, hallways, etc.)
- Identify the support equipment that will be required and the dimensions:
 - Refrigerator _____
 - Glass washer _____
 - Exhaust Hood _____
 - Autoclave _____

Determine the laboratory layout, including wall-mounted storage and counter top space, to accommodate the required instruments, equipment and methods. Keep in mind possible future space needs.



- Always consider how many people will work in the lab, and how many work stations they will occupy.
- Determine work station equipment requirements; for example:
 - Laptop or desktop computer(s) _____
 - Printer _____
- Consider the ergonomic requirements for lab technicians, and whether sitting, standing, or a combination of both is necessary at work stations.
- For sensory analysis, determine the desired panel size, and the necessary space.
- Plan for an adequate amount of storage, including:
 - Ambient materials storage _____
 - Refrigerated storage _____
 - Incubation capacity _____
- Determine the size and quantity of glassware storage that will be needed, which should be based on the amount, and type, of routine analyses.



- Consider the number of sinks needed, and the dimensions of the items to be washed by hand.
- Recognize the lighting needs necessary to perform laboratory work, and whether daylight impacts the laboratory environment.
- Understand which local codes and regulations pertain to laboratories, and inquire about relevant permitting requirements related to construction and build-out.
- Use the International Building Code for additional design codes, requirements, and best practices.

Once the scope of your quality program and specific laboratory needs have been determined, incorporate the available space into a formal layout. Develop multiple layouts and discuss the implications of each with your team.

The American Society of Brewing Chemists (ASBC) has developed resources to help determine the scope of a brewery lab, based on production volume and desired analyses. See their [Grow Your Own Lab](#) resource for additional guidance.

MATERIALS OF CONSTRUCTION

Selecting the appropriate materials for a laboratory is critical to ensure that the space is fit for its purpose. There are a variety of options depending on the function, durability, look and of course, budget.

Three key design and construction elements are cabinetry, countertops and flooring.

Cabinets are usually made of plastic laminate, wood, or metal. There are other options, including stainless steel, phenolic resin and polypropylene, but these materials tend to be expensive and are generally not necessary in a brewery lab environment.



Plastic laminate cabinets may be a good option for a limited budget. This material can be easily customized for a fraction of the costs of other cabinetry. However, laminate cabinets will eventually degrade and the laminate can separate from the substrate. This is of particular concern where there is moisture (around a sink or glass washer), or where there are high levels of heat or acid exposure.

Wood cabinets are typically sturdy and robust, and will last for years. Wood can be resurfaced if necessary, but can deteriorate when exposed to certain chemicals and moisture.

Metal cabinets can be costly, but they are typically more resistant to damage from moisture or chemical contact. Depending on the type of metal employed, surfaces can be easier to clean and less susceptible to chemical and microbiological contamination.

Metal cabinets should be enameled to prevent corrosion, and can come in a variety of configurations to suit workspace needs.

Countertops must be built to handle the most wear and tear throughout the life of the laboratory. Many of the material options for cabinets are available for countertops, therefore, the potential pros and cons are similar.



Epoxy resin, while a bit more expensive, is a popular countertop choice, because it is durable, economical, and widely found in industrial laboratory settings. The material can withstand high heat loads, including open flames, and resists deterioration under harsh conditions.

Phenolic resin functions similarly to epoxy resin, but does not hold up well when exposed to heat greater than 350°F.

Flooring considerations, much like the rest of a brewery, need to account for what might be spilled on the floor, what testing and evaluation will be performed, and ease of cleaning.

While the laboratory floor may be subject to minor chemical spills, it will not be subject to the same rigors as a brewery production floor. Flooring material should be fairly robust and easy to clean. Materials could include polished and sealed concrete, epoxy, or even vinyl tile. Consider adding anti-fatigue mats, as technicians will likely spend hours a day standing at lab benches.

UTILITIES

During design, identify which utilities the laboratory will require, such as power, HVAC (heating, ventilation and air conditioning), plumbing, and compressed gases.

For electrical power, consider the following:

- The electrical requirements for instruments and equipment, including voltage and amperage.
- What kind of office equipment will be necessary for workstations? Will each station require an outlet?
- Will communications drops be necessary?
- What are the lighting needs?



For HVAC, consider the following:

- What level of air filtration will be necessary?
- What are the exhaust needs for current and future equipment?
- Can the air be recirculated or does it need to exhaust to atmosphere?
- What temperature and humidity levels are desired, and how will this be controlled?

For plumbing, consider the following:

- In which areas will floor drains be necessary?
- What chemicals will be going down the drain?
- What current and future appliances will require plumbing hookups?
- How many eyewash stations or emergency shower stations are needed, and will they be standalone or hooked into plumbing?

For Fire Protection, consider the following:

- What codes are required for fire protection by the NFPA (National Fire Protection Association) and local municipality regulations?
- Will alarming be required?
- What chemicals will be used in the lab now and in the future?
- Where will fire extinguishers be located?

For compressed gasses, consider the following:

- Will compressed air be needed to operate lab equipment or to dry glassware?

- What gases will be necessary for testing?
- Where will gas canisters be stored in comparison to where they need to be used?
- How will the canisters be secured?
- Will hoses be necessary?

YOUR FUTURE LAB

It is important during the layout of your laboratory to consider future equipment or expansion needs. This is especially true regarding potentially expensive utilities, like plumbing, ventilation electrical and drains.

