

How To Choose Best Muffle Furnace For Laboratory?

MUFFLE FURNACE



A Quick Overview of Muffle Furnace

A Muffle furnace is also known as a Ashing Furnace or Hot Chamber furnace, .

It is designed to use high-temperature applications such as creating enamel coatings, melting glass, technical ceramics or brazing, and soldering. They are also used in many research facilities for different purposes. For an instance, chemists use it to determine the total percentage of the sample that is non-combustible and non-volatile.

Uses of Muffle Furnace

A Muffle Furnace is used in rice laboratories, scientific experiments in the physics lab, biotech companies, paint & steel industries, and small-scale production industry. It finds its important applications in annealing, coal analysis, general laboratory testing, lime calcination, leaves carbonization, etc.

Besides, it is also ideal for isolating materials from contaminants from combustion. All these make this equipment suitable for heat-treating applications, ashing samples, and material research. Furthermore, it also finds wide usages in melting glass, technical ceramics, brazing & soldering, and creating enamel coatings.

In short, the 'Furnace' is used for the process such as:

- 1- Annealing
- 2- Refractory Metals
- 3- Technical Ceramics
- 5- Sintering
- 6- Powder Metals
- 7- Metallizing
- 8- Brazing
- 9- Glass Formation
- 10-Firing & Co-Firing

Temperature Range of Muffle Furnace

The furnace is rugged construction equipment that is mostly used to change the physical characteristics of samples at high **temperatures that may range from 800°C to 1800°C, depends on the various application protocols.**

Muffle Furnace in Different Industries

- 1- Molding Industry
- 2- Glass Industry
- 3- Rubber Industry
- 4- Ceramics Industry
- 5- Biomedical Industry
- 6- Paint Industry
- 7- Plastic Industry

Factors to Consider Before Choosing Muffle Furnace for Laboratory

Based on the muffle furnace specification and requirements in the lab, this should be chosen. However, certain important parameters should not be overlooked when planning to buy the best muffle furnace for laboratory use. Check out the below-listed factors before you choose the one:

1. Categorize Your Application

Whether you want to test polymer, rubber, or food samples, it is very essential to know that about the exact temperature at which the sample will start converting into fumes. In case you are clueless about it, do not miss checking the testing standards that best suits it.

2. Classify the Space Requirement

There are possibilities that your small lab does not have enough space to keep this bulky box. Well, in such a case measure the dimension of the machine.

3. Classify the Dimensions of the Chamber

Based on the industrial chamber, the size needs to be known. In case you wish to test a rubber or polymer sample, it will have a specified size for the chamber. However, for food sample testing, the chamber size varies.

4. Safety Features

It is very imperative to have safety features in place when choosing it. Keeping this fact in mind, always look for an auto-cut-off sensor that is responsible to control the burning of heating coils as well as overheating.

5. Environmental conditions in the working area/lab.

It is very significant to note that suitable conditions are mandatory for the hassle-free working on the Muffle furnace. Always remember that in case you are placing it in a moist location with very little ventilation, the possibilities of its breakdown are high. The machine should have a VENT PORT for releasing fumes of the compounds. Lack of proper air circulation may lead to flaws in testing and its wrong result.

How do I select the model?

In general we provide two types of models as follows....

1. **STD** - which is made of Inside **CERAMIC MUFFLE** and Outside Powder coated.
2. **GMP** - which is made of Inside **CERAMIC MUFFLE** and Outside **S.S 304**.

Difference between STD & GMP for (MUFFLE FURNACE)

- Apart from electrical hardware there is major difference in exterior and interior construction.
- The common factor is with the interior construction of **CERAMIC MUFFLE BRICKS**.



- whereas GMP models are used in QC Laboratories of various mfg. industries & premium organizations who are bound to follow FDA compliances & various other national international standards.
- If the installation environment is highly corrosive than it is recommended to select the GMP model.
- Also the GMP model does not require any painting or maintenance since the entire body is made up of Stainless Steel, which guarantees a life of more than 15 years.
- You can select any of the two Models since apart from the material of construction all the other features and specification are same.

SOP for operating muffle furnaces:

General rules:

Think about the chemical reaction during heat treatment (melting point, vapour pressure, possible by products, etc).

- 1) There are several muffle furnaces in oven room. It is possible to categorize the type of furnaces by.

- (A) with and without time controlling program,
- (B) operating temperature range.

Choose the furnace you want to use depending on your demand.

2) Place the sample inside the furnace. Never place the sample directly in the tube, use the QUARTZ or SILICA crucible. Use the lid or other cover if you expect evaporation of your sample.

3) All furnaces have the maximum temperature for regular/daily operation. Do not exceed the maximum temperature, otherwise the heating elements are damaged. For the furnace without time controller, set target temperature to heat up furnace. For the furnaces with time controller, program heat treatment sequence and run. Ramping rate should not exceed 5°/min to save life time of heating elements.

4) For the furnace without time controller, set temperature below R.T. to cool down. For the furnace with time controller, furnace is cooled down based on the program. Do not try to cool down furnace from high temperature by opening door. This also enshorten the life time of heating elements.

5) Remove the sample. Check if the tube hasn't been damaged or contaminated. If it happened, replace it and inform maintenance department.

=====

SAFE JOB ANALYSIS

Subtask	Possible cause of undesired event	Precautions to be taken
Furnace: heating up	Damaging the furnace heating element by excessive ramp rate or mechanical damage Damage to the eye, Skin burns, Gas poisoning	1. Heating ramp rate should not exceed 5°/min) 2. Do not look inside the furnace. If you have to, remember to wear the glasses Remember to wear heat protecting gloves Think of by products of annealing/sintering. Install a gas trap filled with appropriate solution to catch and neutralize gases
Furnace: during operation	Furnace contamination	Place a piece of alumina under the application crucible and put a lid on top.

=====