



4 KEY FACTORS TO CONSIDER WHEN BUYING VACUUM DRYING CHAMBERS

BUYER'S GUIDE

As a process that protects materials and products, vacuum drying is used in many sectors of industry and research. Its applications range from drying food products to the challenge of testing materials.

We have put together this Buyer's Guide to help you maintain a broad overview while considering all the many different applications. We start by explaining how vacuum drying chambers work in general and then take a look at the key properties a decent unit will possess, so you know exactly which details you should be looking out for when making your own choice.



The VD and VDL series from BINDER are suitable for non-flammable materials and materials containing flammable solvents, and they feature a unique safety concept.

How vacuum drying chambers work

Many materials cannot be dried at extremely high temperatures (in a process called tempering). The conductivity of electronic components may be reduced at high temperatures, for instance.

There is also always a risk of oxidation or corrosion occurring during standard drying processes.

Food such as fruit loses some of the vitamins inside it when dried at high temperatures and the consistency is altered significantly during standard drying processes.

Materials containing highly flammable solvents must not be dried at high temperatures.

In all of these problematic cases and many more, the solution comes in the form of the vacuum drying process. The test specimen or the material, component or similar to be dried is placed entirely inside the vacuum chamber. The pressure in the chamber is then dropped until a vacuum has more or less been created. As a result, the material's boiling point is reduced and the water molecules are released and guided out of the chamber with the process air in the form of steam. The material is dried.

It is possible to speed up this process by adding heat, but as heat can naturally not be supplied through the air in the vacuum, it is introduced via contact points (such as heating plates). These kinds of accessories will be part of the standard equipment that comes with a decent unit.

Everything you need to consider when buying vacuum chambers

- 1. Interior volume**
- 2. Temperature range**
- 3. Equipment and operation**
- 4. Safety concept**
- 5. Conclusion**

1. Interior volume

The smaller the chamber, the quicker a more stable vacuum can be built up. That's why the interior volume of vacuum drying chambers is usually less than that of standard drying chambers. It goes without saying that there are huge special solutions for specific applications, such as within the food industry, but you will usually find that the interior volume of regular vacuum drying chambers is somewhere between 20 and 150 liters. Most manufacturers have a range of different sizes that have proven to be effective in practice and you can choose between these on the basis of the intended use.

What this means for you is that first of all you need to consider the size of the test specimen or items to be dried before purchasing your vacuum drying chamber. The dimensions of your vacuum drying chamber are of crucial importance and will depend on your requirements.



Chrome-plated racks will enable you to dry test specimens homogeneously on several levels.

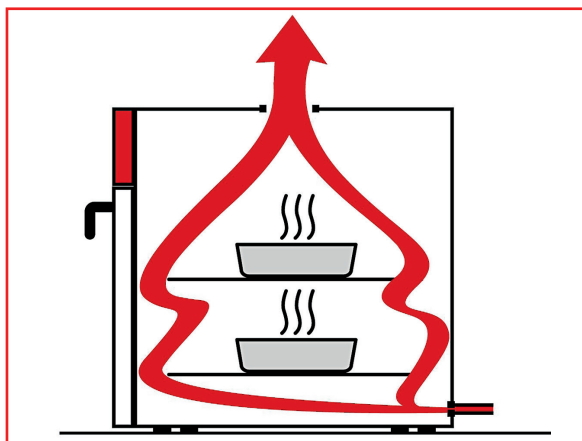
Do you need to dry multiple items at once on a regular or even ongoing basis? If so, we recommend that you buy a bigger unit rather than opting for several smaller ones, for example.

If you are planning to use your vacuum drying chamber mainly for material testing on samples that are always of a similar size, your best bet will be to find a chamber that is only just slightly larger than the samples. This will allow for a vacuum to be built up as quickly as possible, which will in turn speed up the overall drying process.

2. Temperature range

Depending on the application in question, an external heat supply may be required for the vacuum drying process. This is the case if you are drying fruit, for example. Many materials, composites, and solvents, however, can become really dangerous when dried at high temperatures.

It is on that basis that vacuum drying chambers are available with a temperature range varying from around 5°C to around 300°C and higher. Do you need a universal unit in your lab? Or will you always be using your unit for the same purpose – purely for drying?



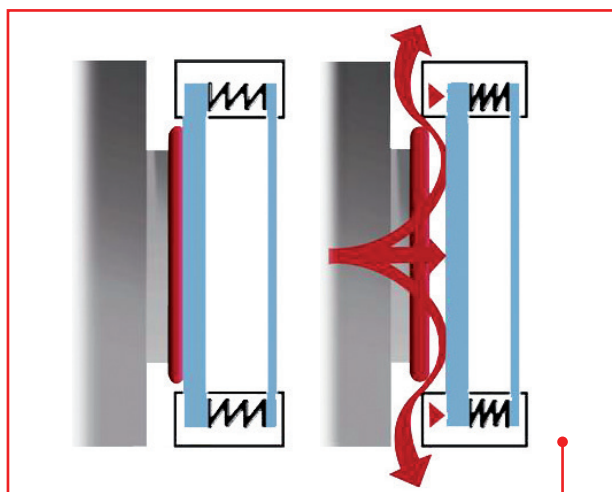
The BINDER Cross Flow Principle accelerates the drying process, with an even flow throughout the interior from the bottom to the top.

When it comes to the design and production of vacuum drying chambers, BINDER has experience spanning decades. We will be happy to offer you advice to help you choose the right unit for your specific application.

3. Equipment and operation

Above all, lab technology needs to be suitable for use in practice. As vacuum drying chambers are usually used continuously, all of the components within the unit need to be as durable, low-maintenance, and easy to look after as possible. All of the surfaces should be easy to clean and the unit should ideally have an interior sterilization option.

A window is required to allow for visual checks during the drying process. It goes without saying that this should be made of safety glass and spring-mounted where possible.



The safety glass panel and the whole interior of BINDER vacuum drying chambers have an Ex rating in line with ATEX Directive 94/9/EC: II -3G IIB T3-T1 Gc X.

Pre-installed inlets and supply lines make it easier to upgrade a vacuum drying chamber. An inert gas supply line, for example, means that the nitrogen process can also be performed in the unit.

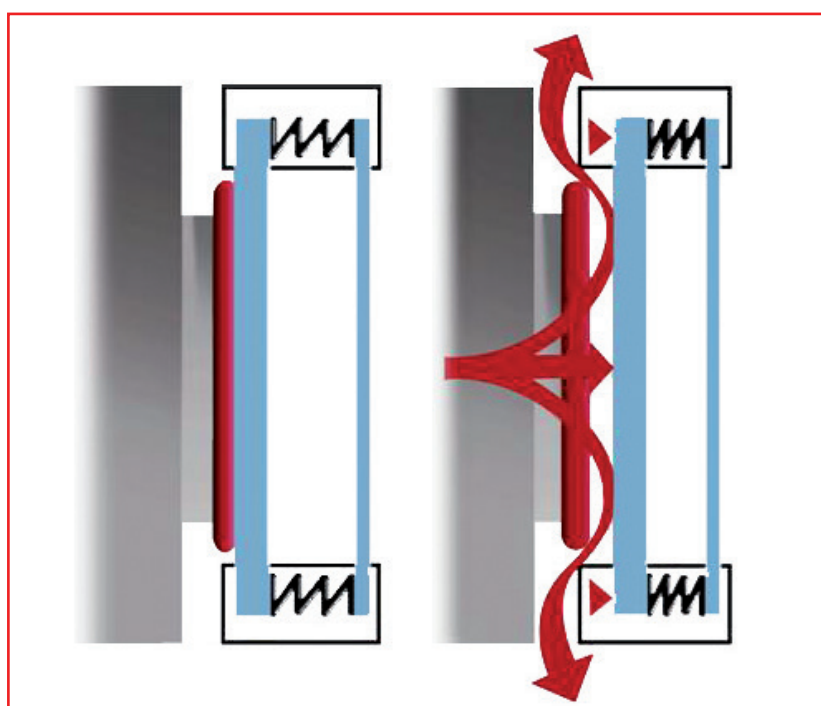
Suitable devices – plates, cylinders, boilers, and so on – are needed to transfer heat directly to the material being dried. These kinds of tailored accessories will be part of the scope of supply provided by good manufacturers.

4. Safety concept

Don't expose yourself to any unnecessary risks by using non-specialist units to dry flammable materials and substances. Not only will you put your employees' health at risk, you will also find yourself in breach of the EU ATEX Directive.

In its VDL series, BINDER has developed special vacuum drying chambers for flammable solvents. These innovative drying chambers combine effective drying with a sophisticated safety concept. Drying is taken care of quickly and without residues, scaling, or oxidation.

Safety is guaranteed by the VDL vacuum drying chambers for flammable solvents first and foremost by their explosion-proof interior. Adjustment without overshooting also provides maximum protection for samples, while a unique safety concept is in place where operation is concerned. The design and innovative equipment comply with ATEX II 3G standards.



An inert gas connection for interior flushing and the decoupling of electronic components from the interior are extra safety precautions.

5. Conclusion

Vacuum drying chambers have an extremely wide range of potential applications. With that in mind, you should always consider the primary intended use above all when selecting the ideal unit to suit you. The options available range from relatively small chambers for testing materials to systems that take up entire halls for producing dried fruit.

Here at BINDER, we have a selection of standard sizes to suit the majority of applications. When purchasing a vacuum drying chamber, the most important factors to bear in mind are the equipment and the practical operation of the unit. Quality soon pays off during everyday use in a lab setting.

As an experienced manufacturer, BINDER has the expertise required to help you make the vacuum drying process work effectively for your application. We would be happy to advise you!

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CHAMBERS NOW!**

