

Advantageous combination

Vacuum drying oven with insulator for drying toxic products



Research laboratories often work with new or insufficiently tested substances. The equipment, apparatus and instruments used in these labs therefore have to be able to cope with all eventualities. A new drying oven was also developed with this in mind.

ANDREAS HOFMANN



The new drying oven meets the most exacting requirements. Both the substances and the operator are optimally protected.

Illustrations: Pink

The development of a new drying oven capable of meeting the most exacting requirements would not have been possible without genuine teamwork. Working in collaboration with BPE-Design, Howorth Airtech (insulator) and Charles Thompson (PAN filter), it took Pink just under a year to design the drying oven now in use in a development lab at the world's largest pharmaceuticals group, Glaxo Smith Kline.

Problem: substances with unidentified properties

One of the main difficulties was that as many of the substances to be dried are still in development, very little is known about their properties. The new vacuum drying oven was designed primarily for research labs and other technical facilities with small batches of up to 30 kg each. The oven had to meet a wide range of requirements:

The author works at Pink GmbH, Wertheim.

j the substances inside had to be protected against external influences (batch integrity);

j the oven operator had to be protected (requiring the operator to wear protective clothing is too risky as it cannot be validated);

j the batch had to be 100% retrievable: as every gram counts, it was important that not a single gram be lost during drying or handling;

j the oven had to have a GMP-compatible design;

j to avoid cross-contamination, the oven had to be free of any hidden nooks and crannies.

The following components were selected for the drying oven:

j inlet sluice,

j insulator with integrated PAN filter,

j vacuum drying oven with a specially designed door and

j a closed-circuit tube system and double-flap CTC valve as output units.

The operator loads the system through a sluice with the aid of a closed box containing the toxic products. After loading, the system is flushed out with nitrogen. The nitrogen flows into the insulator on the inlet side (sluice) and exits the system through an outlet fitted with an HEPA filter that can be changed using the glove box. Spent HEPA-filter inserts are disposed of through the closed-circuit tube port. The pressure inside the insulator can be varied between -50 Pa and -120 Pa using the outlet fan. After the operator has opened the box, he/she can use the PAN filter to pre-dry the product. The PAN filter is fitted with a vacuum unit and collection vessel. After pre-drying, the operator puts the pre-dried material into the drying pans and places these in the vacuum drying oven. At the end of the drying process, the operator opens the doors, removes the pans and can extract the product in one of two ways: either by feeding it into the



The shelves in the vacuum drying oven are welded onto the sides and rear wall. All corners are rounded and there are no joints or boreholes.

closed-circuit tube system or via the CTC port, in which case a special vessel has to be docked onto the double flap.

Door design: aerospace engineering

During the project, special attention was paid to both ergonomics and easy handling. The insulator, for example, was de-

signed to be 580 mm deep at the bottom and 480 mm deep at the top. The door, meanwhile, turned out to be quite a problem. A normal door would have taken up too much space (approx. 1,000 mm) as well as being awkward to clean. Pink therefore came up with a special two-door design which was modelled on an aircraft door and can be rotated through 360° to facilitate cleaning. The bearings used for this purpose are also used in the food industry and so comply with FDA requirements.

Both the doors and the entire structure were designed strictly according to GMP principles. All those parts of the system that come into contact with the product are made of Hastelloy C22. The shelves in the vacuum drying oven are welded onto the sides and rear wall – a patented construction that divides the vacuum drying oven into separate charging chambers. All corners are rounded and there are no joints or boreholes. An operator might therefore be forgiven for thinking the drying oven is all of a piece, yet such a design is necessary to prevent cross-contamination. Another important feature of the drying oven is that the temperature deviations on each shelf

For further information:

 www.process-worldwide.com
• More about the new drying oven

 **Contact:**
Andrea Pink: apink@pink.de

 Hall 4.1, Stand D20-D22

do not exceed **61** °C. This means that each pan retains the same temperature throughout the drying process, irrespective of where it is situated.

Easy cleaning via handheld spray gun

The system is cleaned using the handheld spray gun mounted flexibly inside the glove box. Using the insulator gloves, the spray gun can be applied to every part of the system that needs cleaning. All the surfaces to be cleaned are clearly visible and so can be checked instantly. The shelves all slope gently towards the front of the oven so that the solutions used to clean them can drain off easily and be disposed of via the PAN filter. **j**