

Material tests

In addition to standard sterilisation applications, Systec autoclaves are used in a wide range of other applications.

Beyond the common procedures of the European pharmacopoeia, e.g. the Glass Test (for determining the hydrolytic resistance of pharmaceutical glass ware) and the Rubber Closure Test, these applications include a variety of special applications, such as material tests and the simulation of environmental conditions.

In more detail, these special applications include processes for the simulation of ageing phenomena and moisture resistance. Examples given are the Pressure Cooker Test according to DIN EN 60749-33 and the HAST Test (highly accelerated stress test) according to DIN EN 60068-2-66.

Glass Test:

The Glass Test is a test method that examines the hydrolytic resistance of the inner surface of glass containers and eventually classifies them. This is done by determining the amount of sodium and other alkaline earth metals or oxides of alkaline earth that are released from the filled glassware by hydrolysis during treatment with moist heat. The analysis is performed either by titration or by spectrophotometry of the liquid inside the glassware, while the upstream sterilisation process of the two analytical methods is the same. In the autoclave, a special ramp program is used to run various temperature ranges at specific time intervals, whilst the narrow limits of the pharmacopoeia must be complied with.

Rubber Closure Test:

Similar to the aforementioned Glass Test, the Rubber Closure Test is used to examine the chemical resistance of the tested material. In this test, rubber stoppers and caps of pharmaceutical vessels are first placed in suitable glass flasks. In the following, the glass flasks are filled with a prescribed amount of deionised water and are subjected to the sterilisation process inside the autoclave. As with the Glass Test, narrow process limits are prescribed by the European pharmacopoeia for the compliance of the respective process steps. Particularly high demands are made on the cooling options of the autoclave because it must cool the samples from 121°C to 25°C within 30 minutes. Finally, the water is analysed using various methods, and the examined rubber stoppers or caps are categorised.

Pressure Cooker Test:

In this process, semiconductor components are tested for moisture resistance using saturated steam in a pressurised atmosphere. This destructive method is used to simulate a highly accelerated test load. Pressure, humidity and temperature in the autoclave are applied in such a way that failures inside the component housing are being revealed in an accelerated manner. The test is also used by some of our customers to simulate the ageing of magnets.

In accordance with DIN EN 60749-33, the test load in the autoclave is normally carried out over 96 h at hot pressure storage at 100% rel. humidity at $121 \pm 2^\circ\text{C}$ and 202 kPa.

HAST test (highly accelerated stress test):

The Highly Accelerated Stress Test (HAST test) is also used by some of our customers as a kind of an extended pressure cooker test. As described in DIN EN 60068-2-66, the procedure serves as an even

intensified and accelerated moisture test. Consequently, usually electronic components are exposed to the influence of moist heat at 110 °C to 130 °C. This allows the evaluation of the destructive influence of moist heat on the investigated components within a very short period of time.

Simulation of production processes:

Because of the wide range of options of Systec autoclaves, various production processes of large autoclaves can be simulated. These options include the steam/air mixture process, hot water sprinkling, and spray cooling. This allows for the simulation and planning of processes in large autoclaves of the food, pharmaceutical, and packaging industries by applying smaller test approaches in Systec autoclaves.

Pressure chambers and dry heaters:

We are always anxious to please the wishes of our customers in the best way possible and to support their individual applications. To this end, we have many years of experience in manufacturing custom-made products, so that we can meet the needs of our customers with services that go beyond our official product range. Examples of these categories include:

- Autoclaves for vulcanisation
- Pure pressure chambers pressurised with compressed air; completely unheated or dry heated. For testing composite materials or adhesion compounds.

Do you have a special application and would you like to clarify whether it can be carried out in our autoclaves? Please do not hesitate to contact us directly if you have any questions.

About Systemec GmbH

Systemec GmbH is a leading manufacturer of autoclaves (steam sterilizers), in particular laboratory autoclaves, media preparators and filling devices for liquid media as well as microbiological nutrient media. Systemec develops and manufactures (certified to ISO 9001 and ISO 14001) a wide range of products for the modern laboratory in science and research, as well as for biotechnology, pharmacy, quality control and production.

