

Choosing the Right Autoclave for your Application

John Lees, Managing Director, LTE Scientific Ltd

Advances in sterilisation technology and knowledge over the last ten years have been huge, and customers are now demanding more functions and features on their autoclaves to ensure that their loads are sterilised quickly and effectively. The range of autoclaves, options and accessories has never been greater, which means that pitfalls can exist when choosing the right autoclave for your application. On one hand, over-specifying the autoclave wastes money, whilst on the other, under-specifying can leave you with an autoclave which does not fulfil its operational requirements. Careful consideration to the many features available on today's autoclaves will ensure that you get the right product for the right job and below we attempt to unravel just some of the issues you may need to consider.

How will Steam be Generated?

This is an area which can cause some confusion. There are three main methods of generating steam. The first method is by using heating elements inside the chamber. Water is poured into a reservoir to the correct level and away you go. This is the lowest cost option both in terms of capital outlay and installation costs. However there are potential drawbacks. For example, loads will always be wet at the end of the cycle, and breakages/spillages need to be cleared away as soon as possible, which can be messy and time-consuming (leaving the spillage can lead to that familiar smell we all know and love!!!). This can be improved by fitting auto-drain and auto-fill options. An alternative method is to fit a separate steam generator, which on most lab autoclaves is fitted underneath the chamber, within the frame. This is a more expensive option but has the advantage of giving an unencumbered and cleaner work space and dryer loads at the end of the cycle. It can also speed up the cycle times considerably.



23 litre Labclave laboratory autoclave

If you have your own direct steam supply then you have the best of both worlds. The capital and running costs will be lower and the cycles times will be shorter.

Cycle Recording

Most laboratories now require some form of cycle record and historical data for internal traceability and audit trails. The options available here are many. The most popular is to fit a data printer, which should be capable of printing load and chamber temperatures, load pressures, cycle data and cycle status (pass/fail), in line with GLP requirements.

Some autoclaves can now incorporate internal or remote data archiving systems which will store data onto a memory stick/internal flashcard or download direct to a PC. Chart recorders are still

a tried and trusted method for recording cycle data. These now come in a multitude of guises including multi-pen recorders and also graphic types, which again can be downloaded to a PC.

Measuring Load Temperatures

It is important to be able to track the temperature of the load, so most manufacturers will either include a load probe as standard or offer one as an option. The load probe ensures that the load receives the correct exposure time at the sterilising temperature and should also prevent the door from opening unless the chamber/load has reached a safe pressure/temperature (normally 80°C or below).

Vacuum Systems

This is the area that requires possibly the most consideration. Most manufacturers will offer a vacuum pump of some description on some or all of its ranges, but is it right for your application or needs? In essence there are two types of vacuum pump available. The first is a diaphragm vacuum pump. These are relatively inexpensive, but have limited performance. Typically, vacuum levels will reach 500-600mbarA which means their use is limited to providing improved air removal at the beginning of the cycle, plus it will help to dissipate heat in some load types at the end of the cycle. If that's all you need it for, then this is ideal.

However, for more effective air removal (important when sterilising bagged goods or hollow-ware, such as pipette tips, tubing etc), then choosing an autoclave with a liquid ring vacuum pump may be more appropriate. These pumps will achieve a much higher vacuum (typically 30-100mbarA), which offers enhanced air removal, but, more importantly will flash off much of the residual water from deep inside the load during the cooling stage, which gives drier loads, and this can be very important with some load types.

Drying

More customers are requiring that certain loads are totally dry at the end of the cycle. Typical loads can be pipette tips, tubing, glassware, instruments and porous loads such as lab gowns and shoes. Vacuum alone (even using liquid ring pumps) will not achieve totally dry loads. The only way to dry loads effectively is by adding a steam jacket/heat source to the chamber. The heating effect of the steam jacket/heat source plus the high vacuum flashes off all residual moisture from the load, whilst minimising cycle times.

Air Ballast

The longest cycle for a lab autoclave is usually the media cycle. The cooling stage usually needs to be slow in order to prevent bottles/containers from breaking, or to prevent media volume loss due to boiling-over. If the cooling is too fast, the chamber reaches atmospheric pressure too quickly which can cause the breakage or volume loss. An increasingly popular method of speeding up cycle times and reducing the above risks is to specify an air ballast system. This system basically introduces an over-pressure into the chamber during cooling using compressed air. With sealed media, this equilibrates the pressure between the chamber and the inside of the sealed bottle/container, thus preventing the breakage. With unsealed media, the over-pressure helps to keep the media inside the bottle/container.



Touchclave-lab Autoclave



Various laboratory sterilisers



Large capacity laboratory steriliser

Environmental Issues

This is an area of increasing importance to customers, yet it is widely misunderstood. Various methods can be incorporated into autoclaves to improve the usage of such services as electricity and water.

Whilst using fans is an accepted method of cooling autoclave chambers and is offered by most manufacturers, it is quite a slow cooling method (which means it uses more electricity). Many

autoclave manufacturers also offer ranges that use water coils or jackets as a cooling method. These methods obviously use more water than fan cooled autoclaves (although cycle times tend to be much lower, so electricity costs should be less), however you should ensure that these systems are as environmentally friendly as possible. All water should be re-circulated via an integral hold tank. This type of system normally only replaces water once it has reached a pre-set temperature, which can significantly reduce the water usage.

Power consumption is also an issue for many. Most power is consumed during the heat up stage. Selecting an autoclave with the most efficient heating up method will save a considerable amount of money over the life of the autoclave.

The autoclave with the lowest power consumption would be that which uses a site steam supply as no heating is involved here.

Next would be those with separate steam generators kept on constant standby, due to the fact that once the generator has reached temperature, it simply 'ticks over', using relatively little electricity.

Next are autoclaves with either a separate steam generator or internal heaters.

The autoclave most likely to consume the most power would be those which have internal heaters and an auto-drain facility, because this means that the water is drained and replaced after every cycle, making it necessary to heat up the water from cold every cycle.

Hopefully this guide offers you an insight into the increasingly complex area of specifying your next autoclave and highlights some of the areas which will need careful consideration.



Touchscreen Control

Launch of Autoclave Performance Analyser



An advanced process review system, TACTROL ZERO, being rolled out across the entire range of autoclaves manufactured by **Priorclave**, adds further to the already excellent customer support provided by the company's Service and Technical Support team. The system enables Priorclave to provide increased worldwide support ensuring that autoclave users maximise the performance of their steam sterilisers whatever and wherever the application and medium.

Operational data collected by the TACTROL ZERO system can be fed directly to the UK's Service and Technical Support team, enabling them to view and analyse all operational parameters on-line. With data being collected directly at its manufacturing base Priorclave can now support autoclave users more promptly with guidance and programme settings in any country. In the UK this added benefit comes on top of its current three-tier planned maintenance contracts, including Standard Programme incorporating Routine Preventative Maintenance visits to installed site, a Standard Plus option including parts and a Fully Inclusive package covering non routine call-outs.

Circle no. 559

Versatile Cooled Vacuum Oven

As the first manufacturer worldwide, **Memmert** has developed a cooled vacuum oven. Low temperature vacuum drying on a laboratory scale is applied among other things during the drying of bacteria and starter cultures or in the simulation of storage conditions during long distance flights.

The cooled vacuum oven with its interior volume of 29 litres and temperature range of +5°C to +90°C was developed on the basis of the Memmert standard model VO 200. For cooling purposes, a compact, energy-saving and extremely precise Peltier cooling unit was integrated. This way, the Memmert cooled vacuum oven achieves a surface temperature distribution over its entire temperature range of +/- 1 K.

Gentle low temperature vacuum drying and storage of micro-organisms or active pharmaceutical components is particularly applied in the food and pharmaceutical industry. Thanks to this process, unstable substances can be dried at moderate temperatures above zero without causing too much damage to the cell structure. Additionally, the cooled vacuum oven from Memmert can be deployed to easily and cost-effectively simulate storage and transport of pharmaceutical products during intercontinental flights.

Circle no. 561



The NEW IC Cooled Incubator Range

Available in 4 sizes, including a large capacity bench-top/under-bench model.

Temperature range from +2°C to +50°C

Also available from LTE: Autoclaves, ovens, incubators, drying cabinets, freeze-dryers, environmental chambers, nation-wide service.

LTE Scientific Ltd, Greenbridge Lane, Greenfield, Oldham, UK, OL3 7EN
T: +44 (0) 1457 876221 | F: +44 (0) 1457 870131 | E: info@lte-scientific.com
W: www.lte-scientific.com

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*The Spotlight
could be on you!*

Contact **Gwyneth Astles**
Email: gwyneth@intlabmate.com