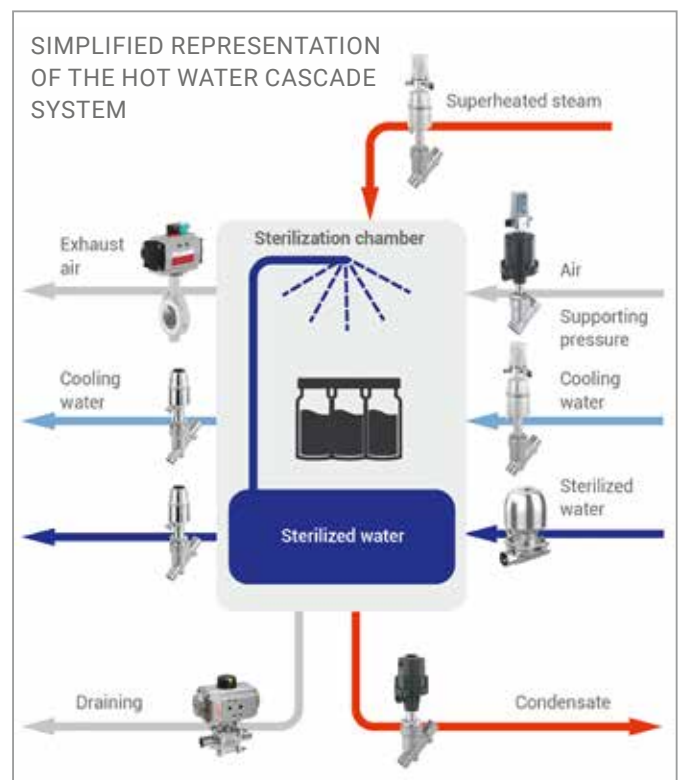


Hot water cascade system - Sterilisation of liquids in closed receptacles

The sterilisation of liquids plays a large role in pharmaceutical and biotechnological production. The hot water cascade system developed by the MMM Group (Münchener Medizin Mechanik GmbH) enables liquids in closed receptacles made of glass or other temperature-resistant materials (such as ampoules) to be sterilised. Products such as the GEMÜ 650 BioStar diaphragm valve, GEMÜ 550 angle seat globe valve, GEMÜ 491 Edessa butterfly valve and the GEMÜ B44 ball valve are used for this.

Due to the higher specific heat capacity of water compared with air (approx. 25%) or steam (approx. 50%), the hot water cascade system is very gentle for the product. The products are exposed to heat over a fairly short time period, and so the advantages of the hot water cascade system lie in the comparatively short lead times. These are due to the low heating and cooling times.

The process is as follows: The chamber containing the item to be sterilised is filled to a pre-defined level (below the item being sterilised) with deionized sterilisation water. This water then circulates through a steam-heated heat exchanger. It cascades over the item being sterilised at a rising temperature. This efficient method of transferring heat enables the item to be heated up in a quick and gentle way. In the subsequent cool down phase, the sterilisation water flows through the now water-cooled heat exchanger and cools the item being sterilised down to a specific temperature. Throughout the process, temperature-controlled supporting pressure generated by sterile-filtered compressed air prevents the tightly sealed receptacles from bursting or becoming deformed.



The pneumatically operated GEMÜ 554 globe valves control the supporting pressure and are used for condensate draining. The process of filling the sterilisation chamber with sterilisation water is controlled by a pneumatically operated GEMÜ 650 BioStar diaphragm valve. Both the steam heating and water cooling processes in the heat exchanger are controlled using pneumatically operated GEMÜ 550 angle seat globe valves. By contrast, GEMÜ 490 Edessa butterfly valves (not shown in the diagram for clarity) are used in the circulation line for opening and closing, as these have significantly more compact installation dimensions yet very high flow rates in comparison with angle seat globe valves of the same nominal diameter.

Furthermore, to meet the stringent process requirements, they are fitted with highly resistant PTFE plastics and FDA-approved silicone as a seal material. Venting and pressure compensation before the sterilisation chamber is opened are ensured by a pneumatically operated GEMÜ 491 Edessa butterfly valve. A pneumatically operated GEMÜ B44 ball valve is used to drain the sterilisation water that is no longer to be circulated

