



# High Temperature Short Time (HTST) Treated Glucose

Ready-to-use, sterile filtered, scalable

Viral safety relies on the basic tenets of “Prevent, Detect, and Remove”. This holistic approach involves careful selection and pre-treatment of raw materials to prevent viruses from entering upstream processes, testing for the presence of viruses, and implementing appropriate inactivation and filtration technologies to remove viruses downstream. This multi-mode approach for viral risk mitigation plans allows the alignment of the appropriate technique to specific process attributes, and we have the deep expertise and portfolio to help you find the best solution for your process.

HTST pasteurization is a highly effective method to inactivate viruses. It involves the rapid heating of the material to a predetermined temperature (>100 °C) and holding it at that temperature for a specified time to inactivate adventitious viral agents that may be present. This technology has been typically used as an in-house treatment for high risk bioreactor feeds, such as glucose, and is becoming an integral part of many biopharmaceutical companies’ viral risk-mitigation strategies.



## In-house or outsource?

Establishing an in-house process to HTST treat media and glucose has challenges and risks:

- The design and installation of an in-line HTST process requires a high upfront capital cost.
- Dedicated resource and knowledge is needed to optimize the process parameters to achieve viral inactivation while ensuring product quality is not affected.
- Operating an in-house pasteurization process will create a single-point failure and potentially a process bottleneck if the equipment is not sized and run appropriately.
- The most effective risk mitigation strategy would be to only use HTST pre-treated high risk raw materials on site, as it would ensure the lowest possible probability of a viral contamination event.

Outsourcing this process step therefore becomes an attractive alternative, and can help mitigate process risk.

## Pre-treated HTST treated glucose

We have expanded our Total Virus Safety portfolio to include HTST pasteurization at an industrial scale. Outsourcing this process step to us provides many benefits:

- Our deep understanding of HTST treatment has allowed us to develop a robust and very effective process that delivers greater than 6 log inactivation of virus – helping you to mitigate risk in your process.
- HTST pre-treated GMP glucose (and other sugars), is available for both clinical and commercial scale operations – providing you flexibility of scale.
- Outsourcing this raw material treatment step saves significant upfront capital expenditure, and allows valuable resources to be devoted to other critical processes.
- Shipping of HTST Glucose in single use bags has successfully undergone rigorous ISTA ship testing, allowing delivery of raw materials in a convenient, ready-to-use format.

## Process excellence and control

To deliver a process that provides sufficient inactivation against a broad range of viruses, the HTST process needs to be precisely controlled. The fully automated HTST process we offer tracks Critical Process Parameters to ensure that material is subjected to the predetermined pasteurization set-points. High quality in-line process control and monitoring allows real-time process analysis and adjustment, and this allows us to deliver reliable pasteurization performance each time.

## Performance

We have undertaken lab-scale virus inactivation trials which have been designed to be representative of the industrial pasteurization processes, both at pilot and commercial scale. The analytical trials subjected a worst case virus, Minute Virus of Mice (MVM), a mammalian parvovirus that is very resistant to physicochemical methods of inactivation, to a series of HTST processing conditions to determine the viral Log Reduction Value (LRV) of different pasteurization temperatures and residence times.

Hold Temp.	Hold Time (s)	Log Reduction Value (LRV)		
		Run 1	Run 2	Run 3
90 °C	10	1.9	2.1	2.1
	40	2.6	3.3	3.7
102 °C	10	≥6.9	≥6.7	≥6.4
	40	≥6.9	≥6.7	≥6.4
105 °C	10	≥6.9	≥6.7	≥6.4
	40	≥6.9	≥6.7	≥6.4

These results demonstrate that HTST is an effective viral inactivation technology for treatment of cell culture feeds, complementing other virus mitigation approaches to minimize the risk of introducing adventitious agents into the bioreactor.

When it comes to viral clearance, there is no room for error. You need products and services from a partner with a proven track record of success, who understands your upstream and downstream viral clearance challenges.

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