

	Technical Information	730-101-EN		V03
	Reasons for wet goods at the end of steam sterilization processes	Created	04.08.2010	JM
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During steam sterilization, all goods are moistened by steam. The sterilizing agent in steam sterilization is water in its liquid aggregate state in combination with a minimum temperature-time window of e.g. 121°C, 15 min. or 134°C, 3 min. This means that all surfaces to be sterilized must be wet during sterilization.

After sterilization, however, sterile items are often not used immediately, but are stored sterile in their packaging, e.g. in a sterile container or a foil-paper bag, until later use. They must be stored in a dry place after sterilization, as a single germ reproduces itself in a moist environment every 20 to 30 minutes and therefore a wet load becomes unsterile after a short time.

Physical principle of drying

While steam condenses on the instruments during heating and large amounts of heat are transferred, the condensate is evaporated again at the end of the sterilization process by lowering the pressure. The heat energy is extracted from the load and the goods cool down. This process is completely independent from the weight of the load, since the amount of heat generated during condensation and the amount of heat consumed during evaporation are always absolutely identical.

Re-evaporation is initiated by decreasing the pressure. Vacuum pumps installed in the sterilizer can further accelerate this process.

Possible reasons for insufficient drying

1. If, during the sterilization process, additional water enters the packs in addition to the condensation of steam, the load misses the energy to evaporate this additional water. The load remains wet at the end of the drying phase.

"Additional" water, i.e. water that has not entered the load through condensation, can have various reasons:

- 1.1 The sterile goods were packaged wet.
 - 1.2 Water drops from packages inside the sterilizer onto packages underneath and penetrates them.
 - 1.3 Wet steam contains aerosols of water droplets which penetrate into packages in liquid rather than gaseous form. Steam can become wet, e.g. due to poorly insulated steam pipes where the steam partially condenses.
2. If condensate within a package inside a sterilizer drops from the sterile product (e.g. from the instrument) onto the bottom of a container, the thermal energy present in the sterile item can no longer reach the condensate at the bottom of the container and evaporate it. As a corrective measure, heavy instruments should be wrapped in

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an absorbent material so that the condensate remains close to the instruments, e.g. by placing an absorbent non-woven in a basket.

3. At the end of the sterilization process, water vapour remaining in the package can condense (particularly critical with plastic goods and packaging) and subsequently lead to humidification of the sterile goods – despite previously successful drying.

In this case, the water vapour remaining in the load can be removed by fractionated air removal at the end of the sterilization process.