

Lyophilisation Process – Design Space

Input Process Parameters

Freezing step

- Cooling rate.
- Holding temperature/Time.
- Annealing temperature/Time.

Primary drying step

- Chamber pressure.
- Shelf temperature.

Secondary Drying

- Chamber pressure
- Shelf temperature
- Drying time



Output Material/Output Process Parameters

Freezing step

- Nucleation temperature.
- Ice crystal size/morphology.

Primary drying step

- Product temperature.
- Sublimation time.
- Drying time.

Secondary Drying

- Residual moisture content.
- Glass transition temperature.
- Reconstitution time.