# SHP Steriltechnik AG

Schloss Detzel 1
39345 Detzel Schloss / Satuelle
Tel.: 039058 / 9762-0
Fax: 039058 / 9762-22


# Application….Solution

# Sterile – what does that mean?

- A subject or a liquid is sterile if it is free of augmentable microorganism.

- sterile does NOT mean clean
- that is to say a sterilization process is no cleaning

- A dirty glas remains dirty after sterilization.
  - it is sterile
  - thus free of augmentable microorganism
  - But not clean!

# Sterile – what does that mean?

**Air – the disturbing factor of sterilizing**

Where is air, there is no steam!

Where is no steam, there is no adequate temperature!

Where is no adequate temperature, there is no successful sterilization possible.

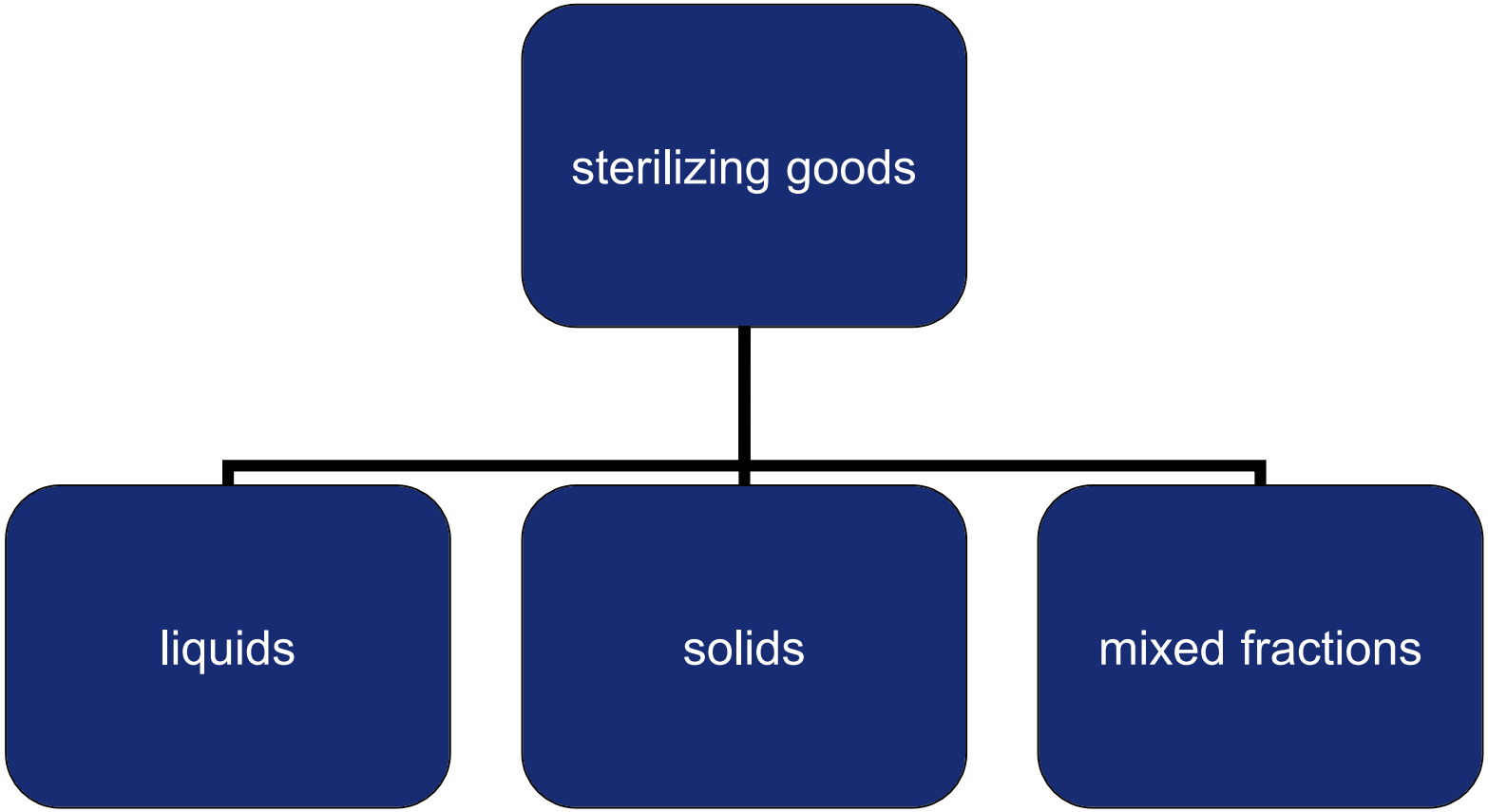
# Sterile – what does that mean?

An efficient evacuation of the air out of the sterilizing chamber is the basis for a successful sterilization!

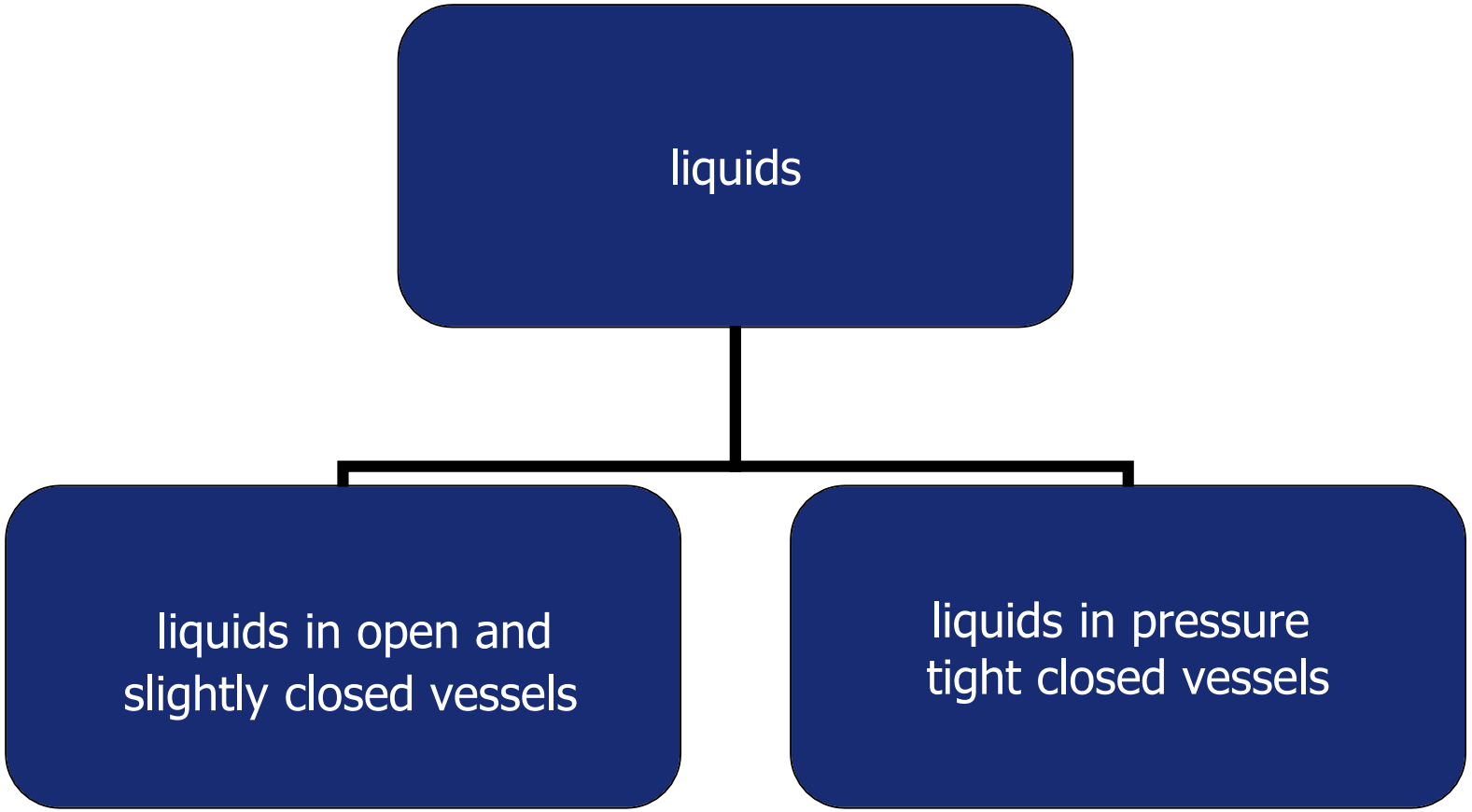
Methods:

- gravitation
- pressure purge
- de-aeration by pre-vacuum
  - simple pre-vacuum
  - fractionated pre-vacuum

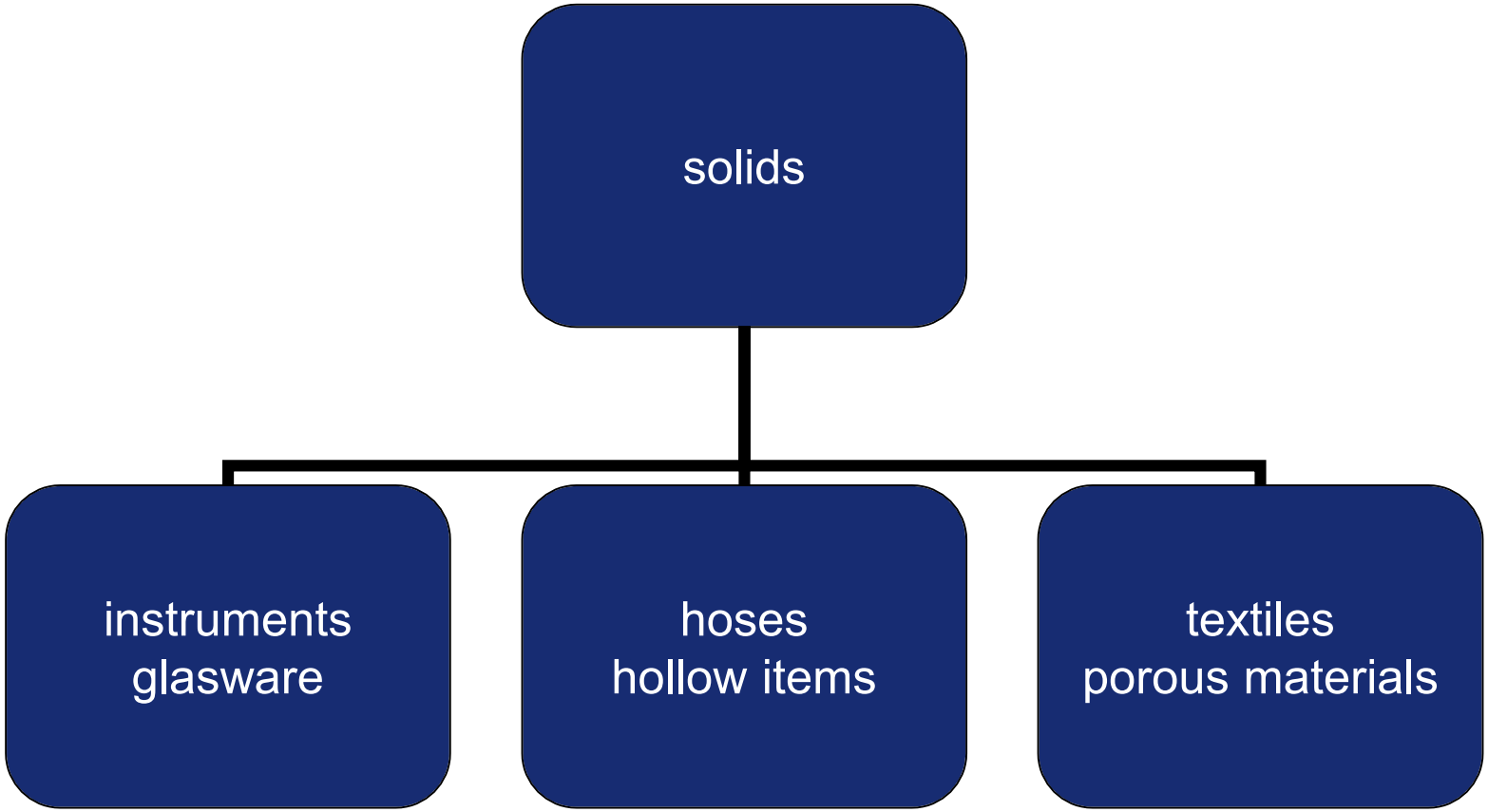
# Sterilizing goods



# Sterilizing goods



# Sterilizing goods



# Sterilizing goods

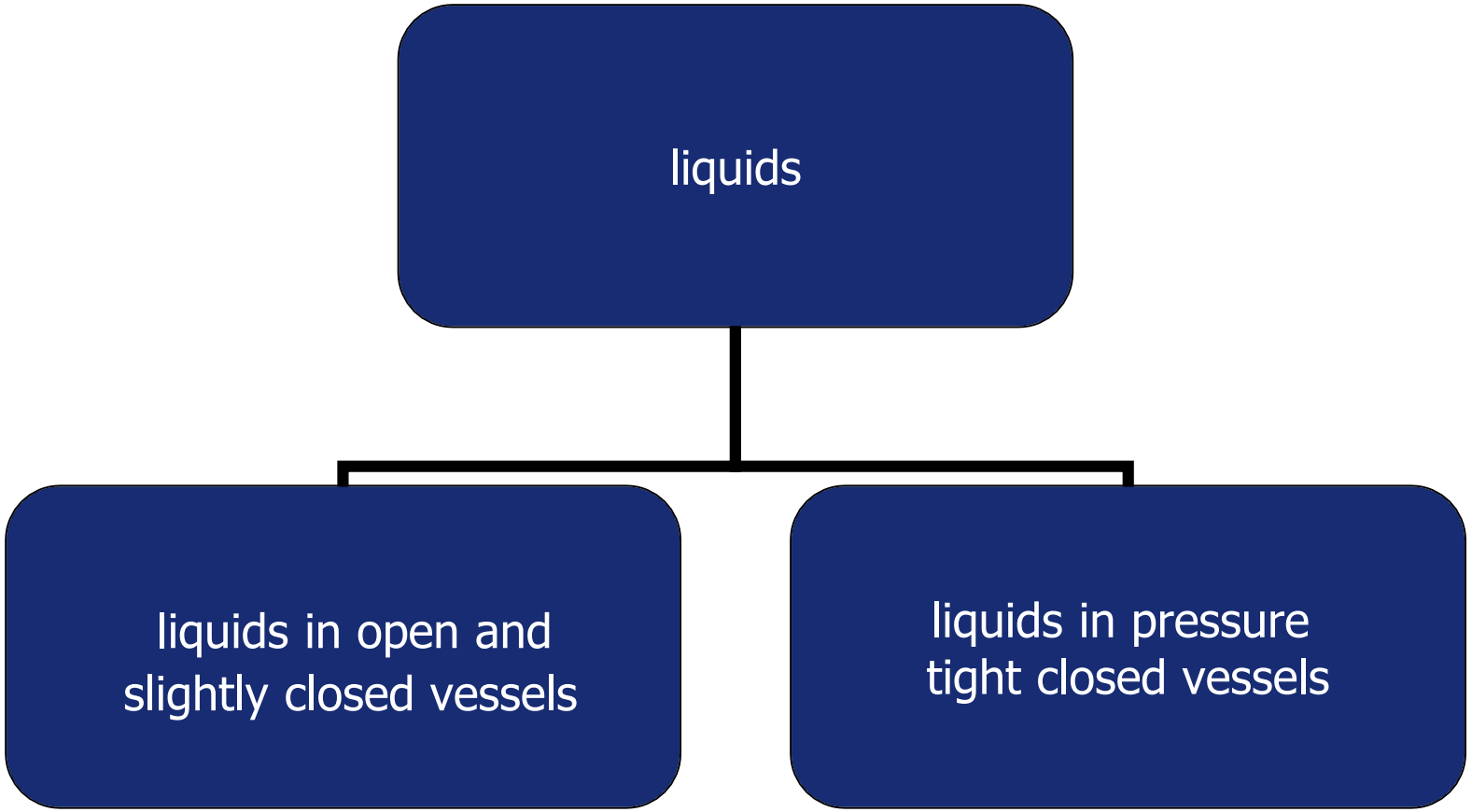
mixed fractions

mixture of:

liquids and solids

(waste sterilization)

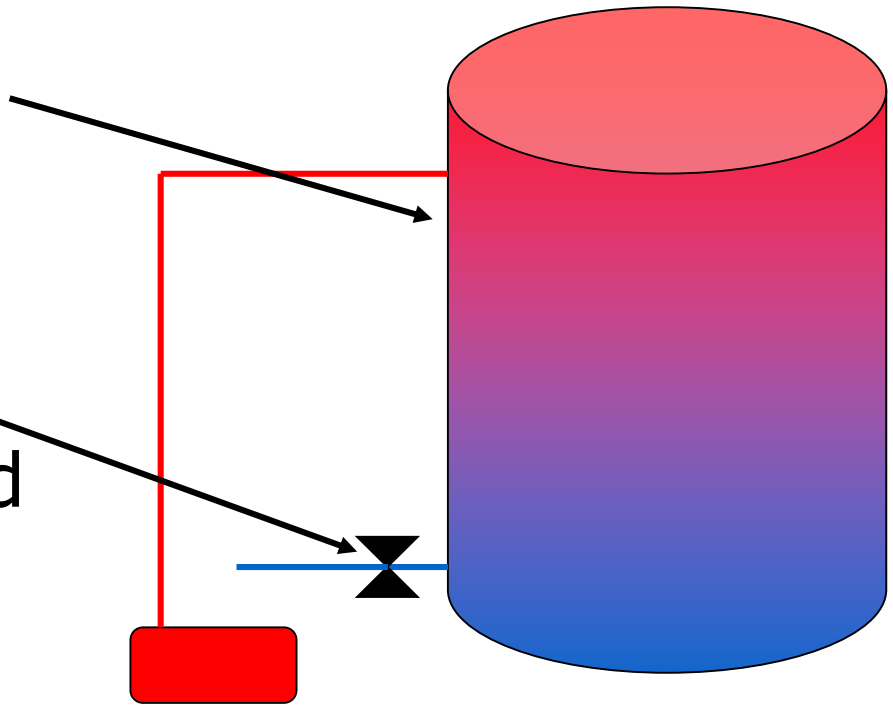
# Sterilizing goods



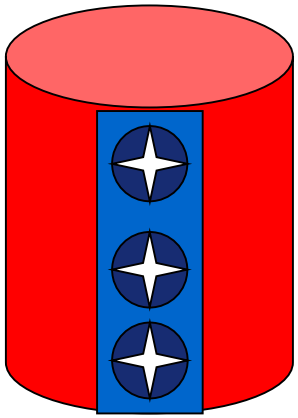
# Methods of de-aeration for liquids

## Gravitation

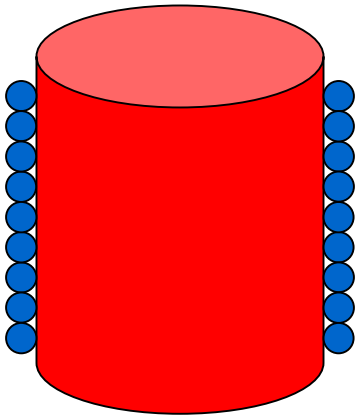
- chamber: filled with air and loading
- steam reaches the chamber, pressure increases
- presses air down
- outlet valve is opened
- air escapes
- at 96°C post de-aeration for 10min



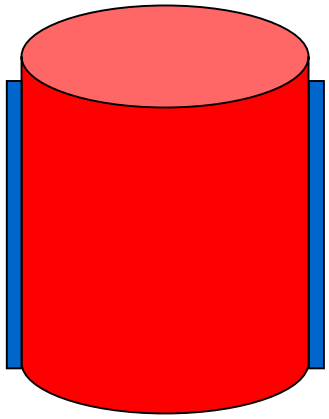
# Re-cooling systems for liquids



air re-cooling



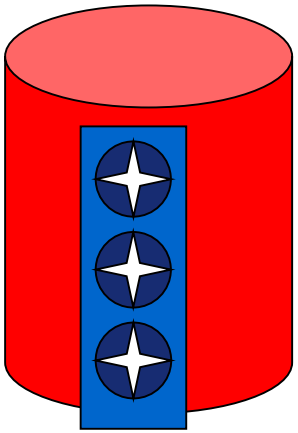
water re-cooling by cooling coil



water re-cooling by double jacket

# Re-cooling systems for liquids

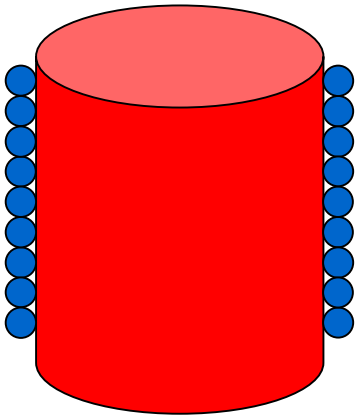
## Air re-cooling



- ambient air is channeled on the surface of the chamber
- cooling only where air hits the chamber
  - ineffective
  - slow
  - small area of contact
- no cooling with counter pressure possible

# Re-cooling systems for liquids

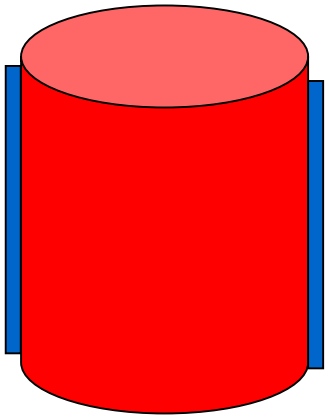
## Water re-cooling by cooling coil



- demineralized water goes through the cooling coil
- cooling only where cooling coil touches the chamber
  - small contact area
- cooling with counter pressure possible

# Re-cooling systems for liquids

## Water re-cooling by double wall



- demineralized water goes through the complete double jacket
- double jacket encloses the chamber
  - big area of contact
  - effective and fast cooling
- cooling with counter pressure possible

# Re-cooling systems for liquids

## Water re-cooling by double wall

**The bigger the area of contact**

- the bigger is heat exchange
- the faster and efficient is re-cooling

**Conclusion:**

**double wall = most efficient re-cooling system**

# Sterilizing goods

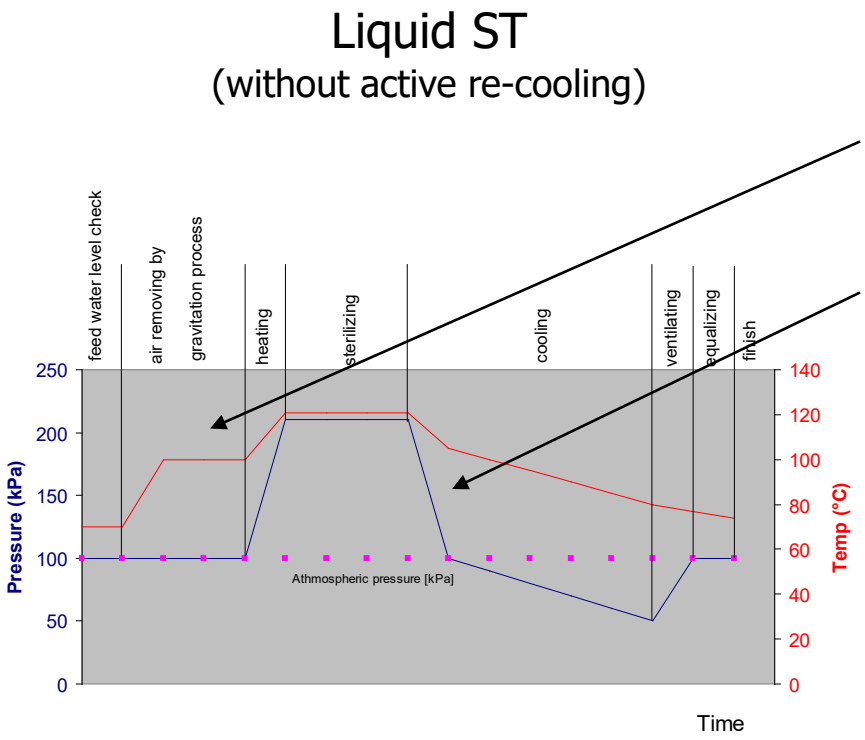
## Liquids – open or lightly closed vessels

- without active re-cooling
- programs:
  - Liquids SL (self re-cooling)
  - Liquids ST (clocked steam outlet)

→ Laboklav 25B
→ Laboklav 55-195B

# Sterilising goods

## Liquids – open or lightly closed vessels




- de-aeration by gravitation
- slow and passive re-cooling (no re-cooling system)
  - only slow pressure purge

**Laboklav 25B** **Laboklav 55-195B**

# Sterilizing goods

## Liquids – open or lightly closed vessels

- active re-cooling
  - loss of liquids possible
- program
  - Liquids RM

→ Laboklav 25M

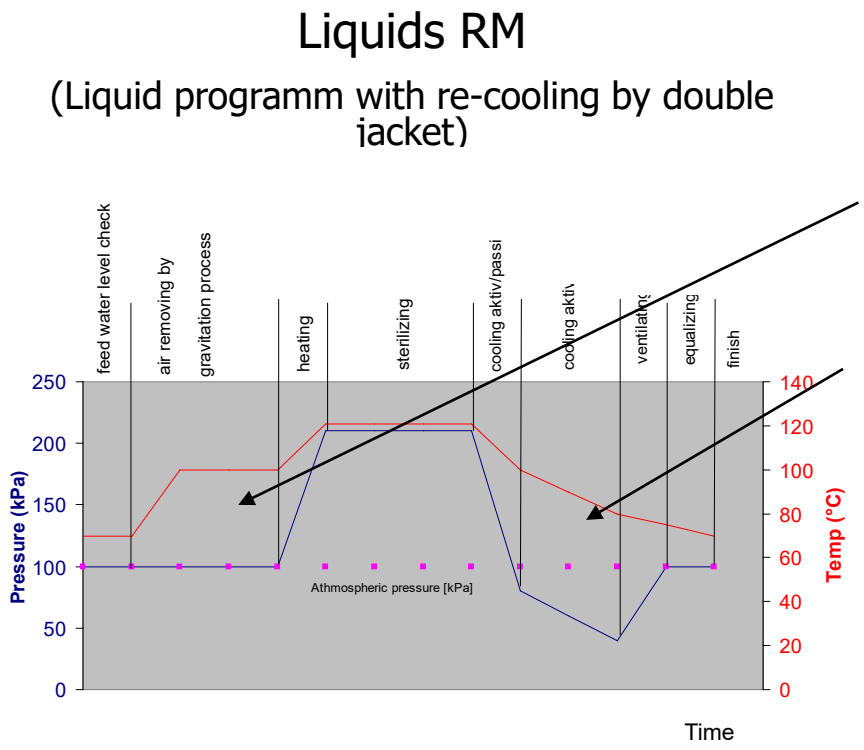
→ air re-cooling

→ Laboklav 55-195M

→ water re-cooling by double jacket

# Sterilizing goods

## Liquids – open or lightly closed vessels




- de-aeration by gravitation
- re-cooling by double jacket
  - loss of liquids in open vessels app. 6 – 12%
  - boiling retardation possible
  - concentration in liquid changes

**Laboklav 25M (air re-cooling)** **Laboklav 55-195M**

# Sterilizing goods

## Liquids – open or lightly closed vessels

- active re-cooling and counter pressure
- but slower than just re-cooling by double jacket
- program
  - Liquids RO
- Laboklav 25

  → not possible

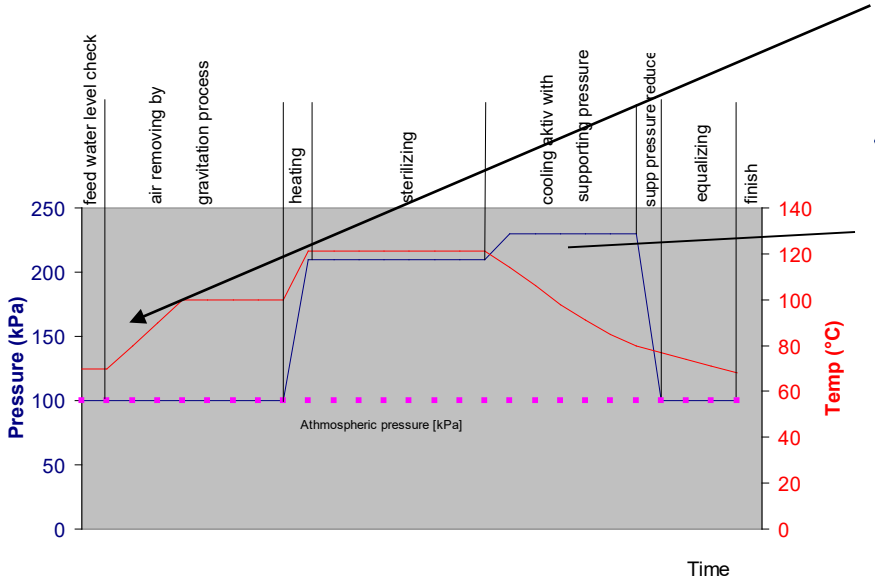
→ Laboklav 55-195MS

# Sterilizing goods

## Liquids – open or lightly closed vessels

Liquids RO

(with re-cooling by double jacket & counter




- de-aeration by gravitation
- re-cooling by jacket with counter pressure
  - no loss of liquids
  - no boiling retardation
  - but slower than just re-cooling by jacket
  - temperature gradients possible

**Laboklav 55-195MS**

# Sterilizing goods

## Liquids – open or lightly closed vessels

- active re-cooling, counter pressure and fan inside chamber
- no temperature gradients inside chamber
- program
  - Liquids RO

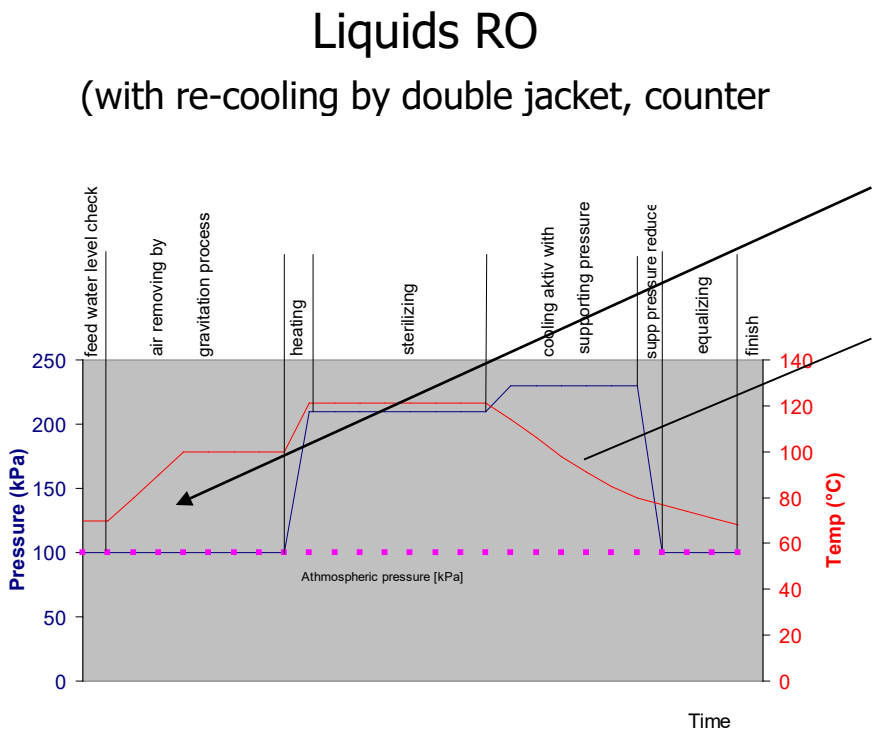
→ Laboklav 25

→ not possible

→ Laboklav 55-195MSL

# Sterilizing goods

## Liquids – open or lightly closed vessels




**Laboklav 55-195MSL**

- de-aeration by gravitation
- re-cooling by jacket with counter pressure
  - no loss of liquids
  - no boiling retardation
  - as fast as re-cooling by jacket
  - no temperature gradients

# Sterilizing goods

## Liquids – pressure tight closed vessels

- water re-cooling, counter pressure and fan inside chamber
- program
  - Liquids RG
- Laboklav 25

  → not possible

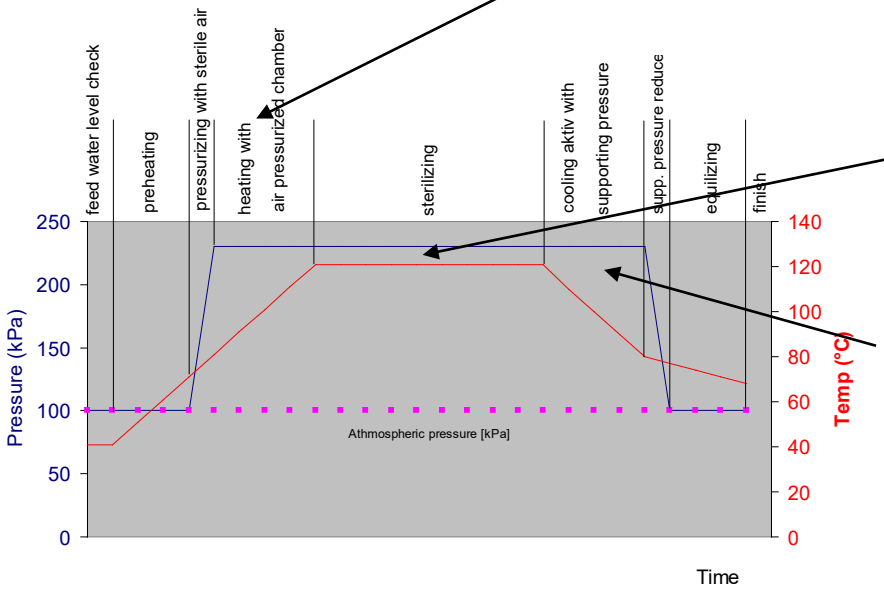
→ Laboklav 55-195MSL

# Sterilizing goods

## Liquids – pressure tight closed vessels

Liquid RG

(with re-cooling by jacket & counter pressure, already during preheating, fan)




**Laboklav 55-195MSL**

- no real de-aeration
  - vibrant de-aeration
- heating with counter pressure
  - overpressure in the vessels because of fast increasing temperature)
  - counter pressure =backpressure
- counter pressure during sterilization phase
- jacket re-cooling with counter pressure and fan inside chamber
  - no temperature gradients inside chamber
  - shorter cooling time

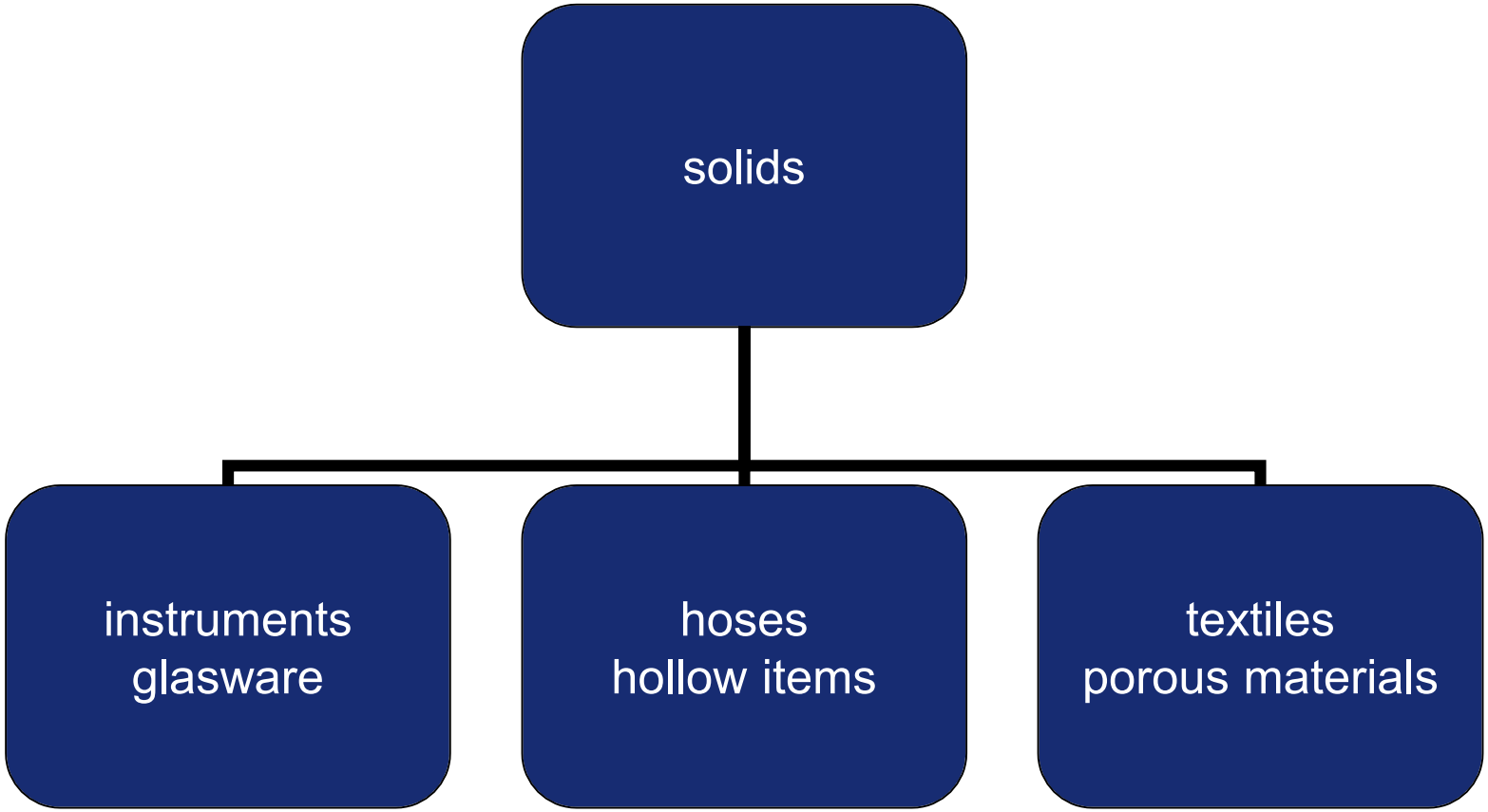
# Please consider on units with counter pressure:

**Laboklav 55-195 MS, MSL, MSV & MSLV**

- autoclaves with the option counter pressure do not work properly without counter pressure
- compressed air is needed for each program
  - compressed air is used for aeration of the chamber
  - air which is led into chamber is pressed through the sterile filter by the compressor and goes afterwards into the chamber

without aeration → no equalisation
→ unit cannot be opened!

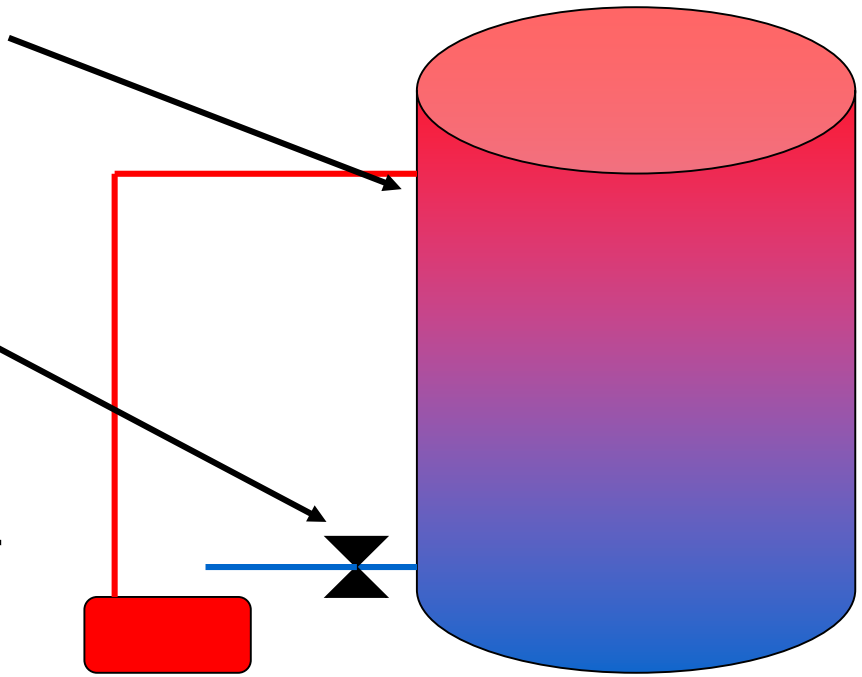
# Sterilizing goods



# Methods of de-aeration for solids

## Pressure purge

- for easy to de-aerate solids
- steam injecting into chamber
  - pressure rises, outlet valve closed
- outlet valve opens, air removes
- meanwhile no injecting of steam
- process is repeated up to 6x



# Sterilizing goods

## Solids – glasware and instruments

- de-aeration by pressure purge
- without drying in vacuum
- program
  - Instruments ST

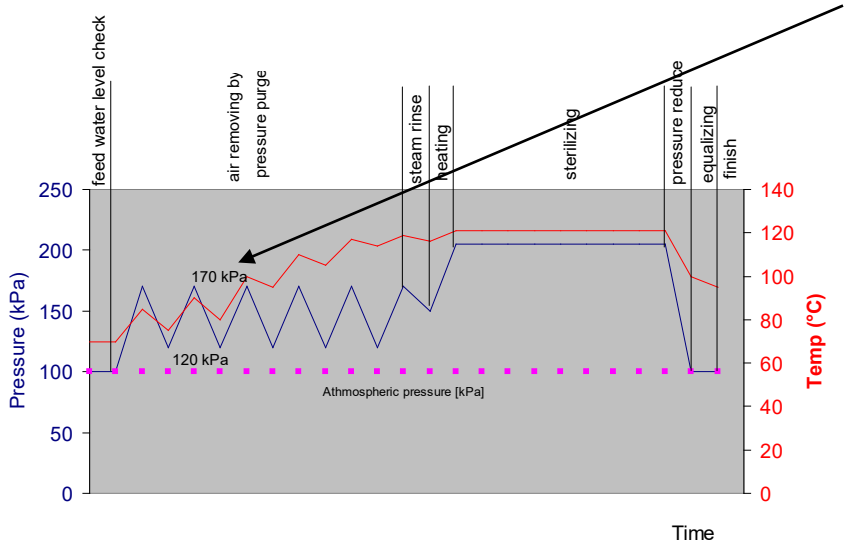
→ Laboklav 25B
→ Laboklav 55-195B

# Sterilizing goods

## Solids – glasware and instruments

Instruments ST

(solid programm)




- de-aeration by pressure purge
- no drying in vacuum

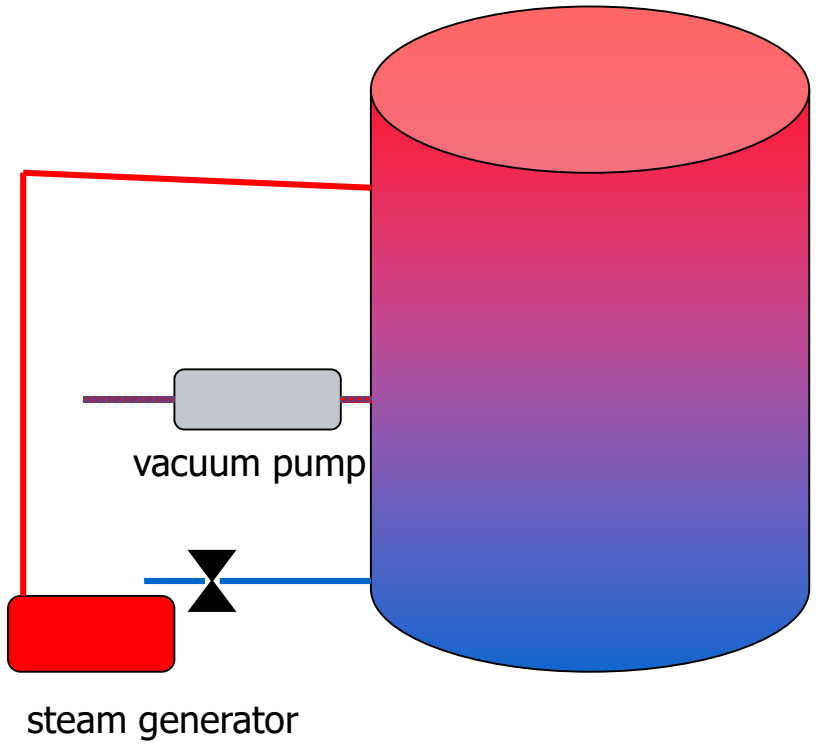
**Laboklav 25B**

**Laboklav 55-195B**

# Methods of de-aeration for solids

## Fractionated pre-vacuum

- method of de-aeration for difficult to de-aerate solids
- simple pre-vacuum
  - until adjusted setpoint
- or fractionated pre-vacuum
  - 3 fractions of de-aeration
- change of steam injecting and vacuum



# Sterilizing goods

## Solids – hollow items and hoses

- vacuum required
  - simple or fractionated pre-vacuum
- drying vacuum recommendable
- program
  - Instruments FV
  - Instruments FV with VT

→ Laboklav 25V

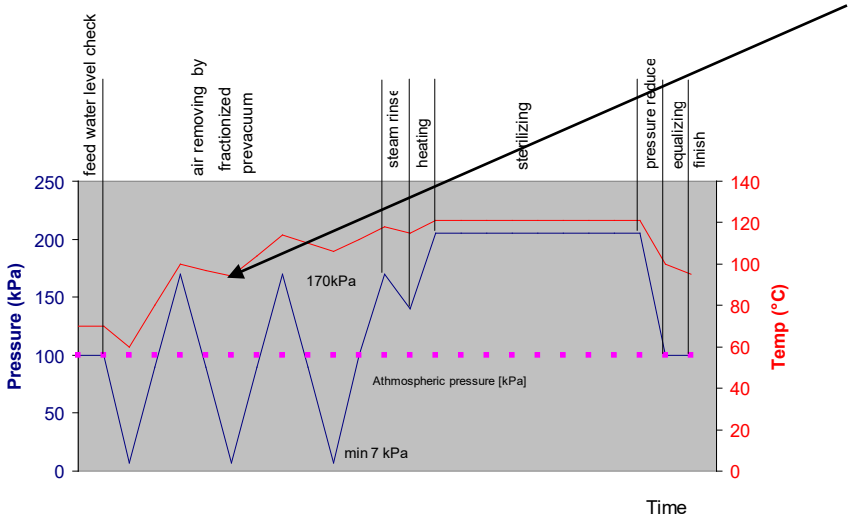
→ Laboklav 55-195V

# Sterilizing goods

## Solids – hoses and hollow items

Instruments FV

(Solid programm with fractionated pre-vacuum)



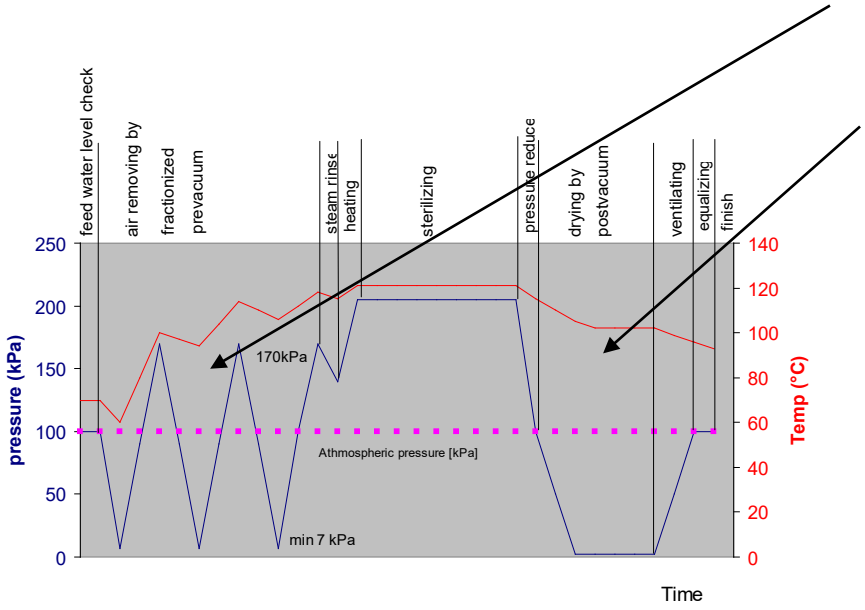

- de-aeration by fractionated pre-vacuum
- no drying vacuum
  - e.g. for pipette tips
  - but necessary for hoses (must be sterile inside)

**Laboklav 25V,55-195V**

# Sterilizing goods
## Solids – hoses and hollow items

Instruments FV with VT

(Solid programm with pre-vacuum & drying vacuum)




- de-aeration by fractionated pre-vacuum
- drying vacuum
  - heating of the chamber
  - condensate on the sterilising good becomes steam
  - vacuum pump pulls steam out of chamber

**Laboklav 25V,55-195V**

# Sterilizing goods

## Solids – textiles and porous goods

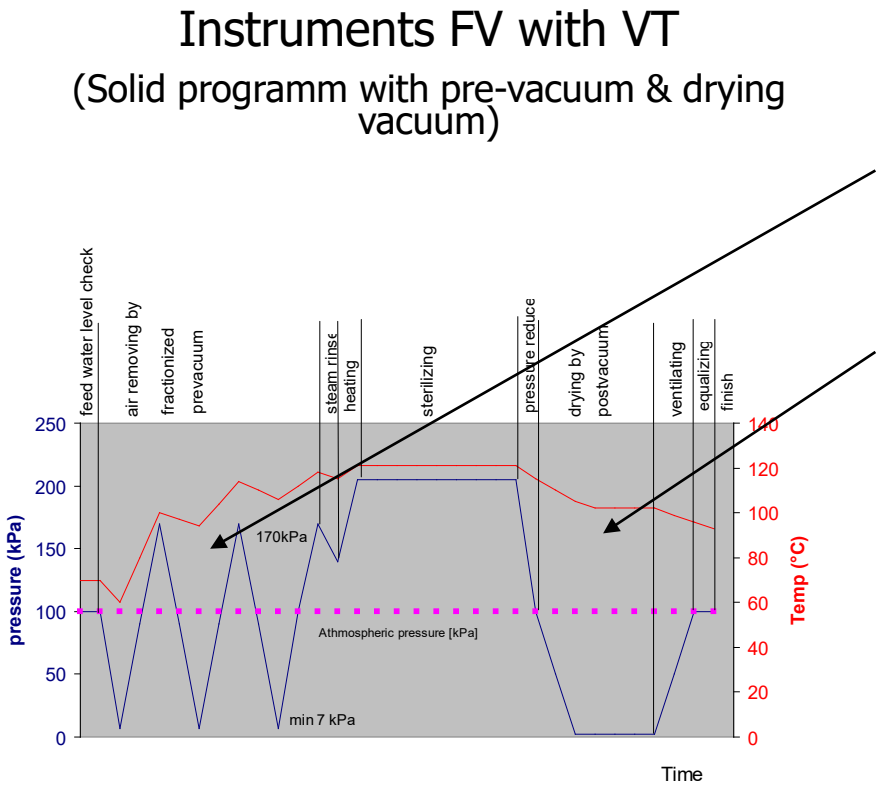
- de-aeration by vacuum
  - fractionated pre-vacuum
- drying in vacuum required
- program
  - Instruments FV with VT

→ Laboklav 25V

→ Laboklav 55-195V

# Sterilizing goods

## Solids – hoses and hollow items

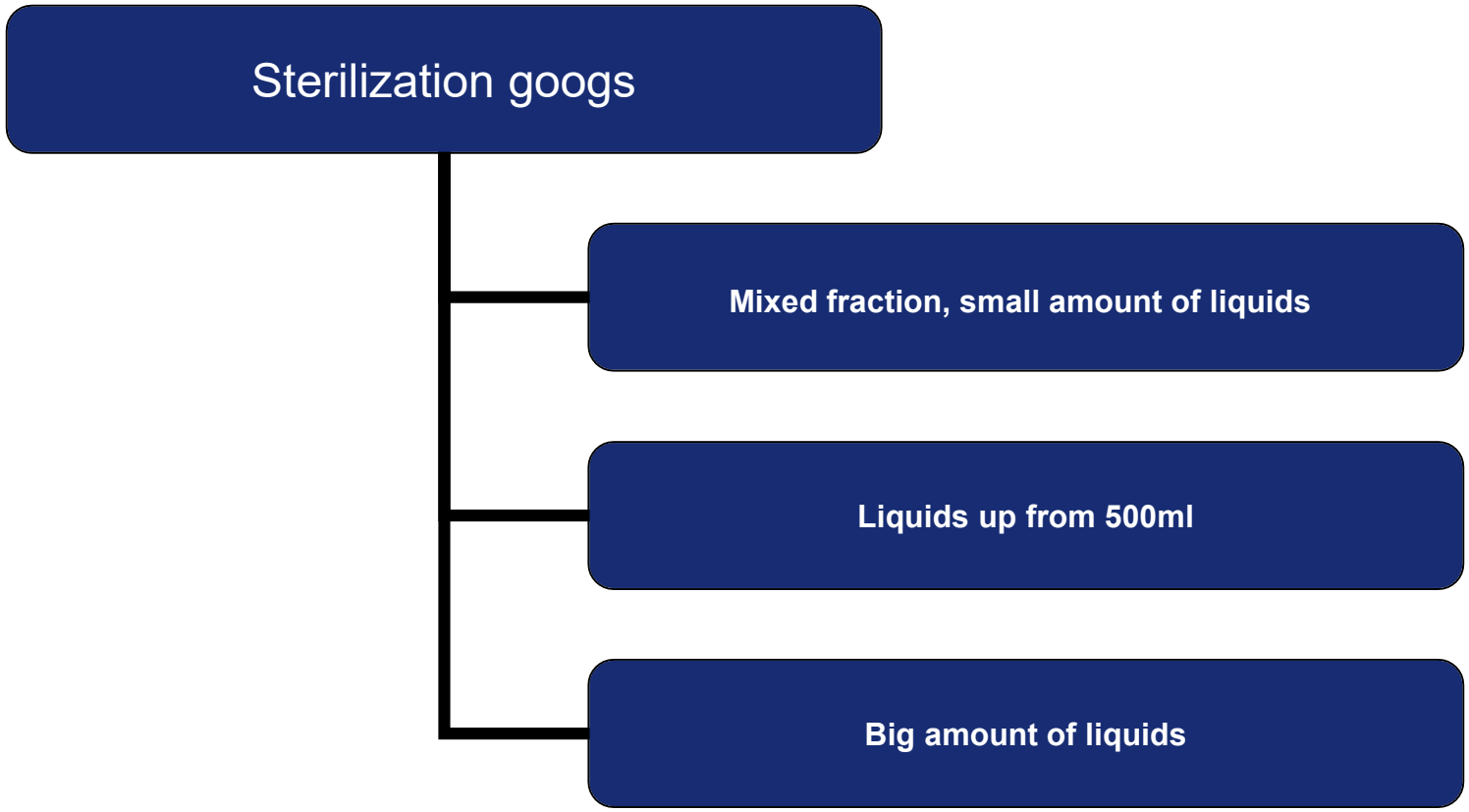



- de-aeration by fractionated pre-vacuum
- drying vacuum
  - heating of the chamber
  - condensate on the sterilising good becomes steam
  - vacuum pump pulls steam out of chamber

**Laboklav 25V,55-195V**

# Sterilization goods

## Waste strilization



# Sterilizing goods

## Mixed fractions – solids and amounts of liquids <0,5l

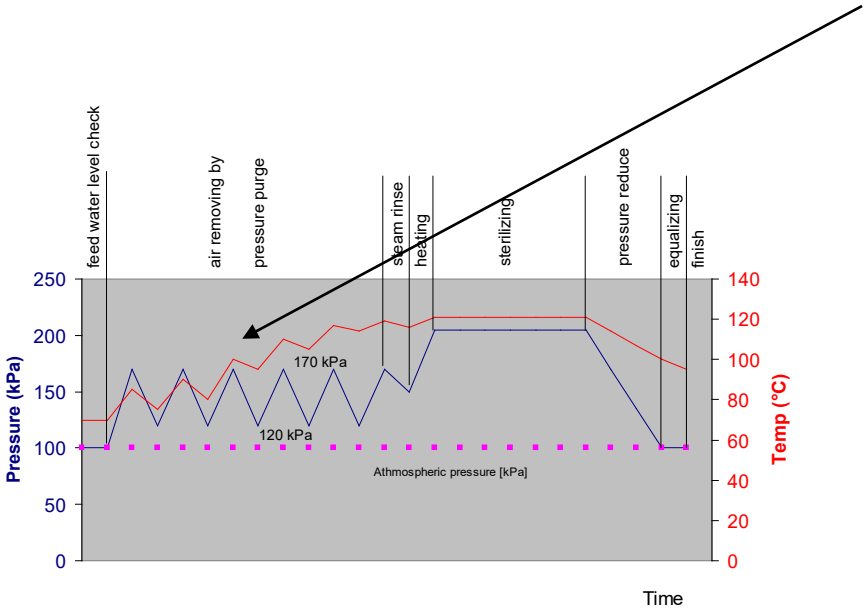
- in open waste bags
  - no pre-vacuum required
  - fill in 0,5l demineralized water into opened waste bag
- program
  - Destruct ST

→ Laboklav 25B
→ Laboklav 55-195B

# Sterilizing goods

## Mixed fractions – solids and amounts of liquids <0,5l

Destruct ST
(solid program)




- de-aeration by pressure purge
- no drying in vacuum

**Laboklav 25B**

**Laboklav 55-195B**

# Sterilizing goods

## Mixed fractions – solids and amounts of liquids <0,5l

- in closed waste bags
  - fractionated pre-vacuum required
- program
  - Destruct FV

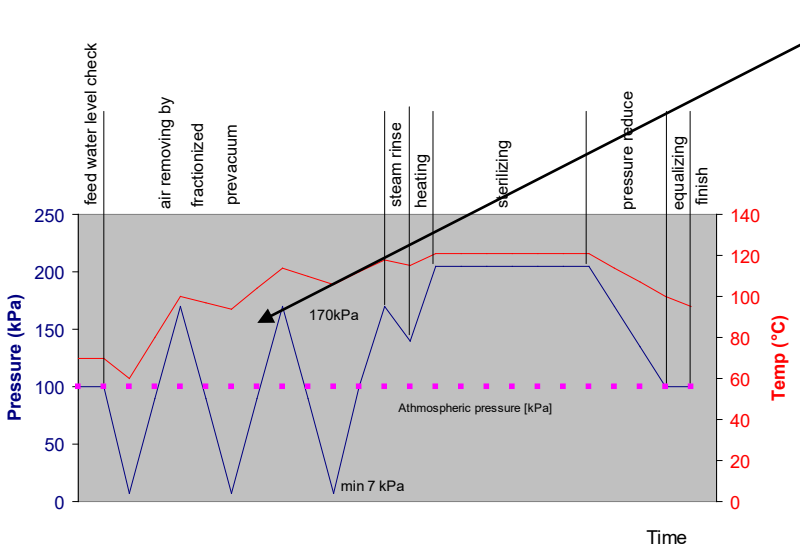
→ Laboklav 25V
→ Laboklav 55-195V

# Sterilizing goods

## Mixed fractions – solids and amounts of liquids <0,5l

Destruct FV

(solid program with fractionated pre-vacuum)




- de-aeration by fractionated pre-vacuum
- no drying in vacuum

**Laboklav 25V**

**Laboklav 55-195V**

# Sterilizing goods

## Mixed fractions – solids and amounts of liquids >0,5l

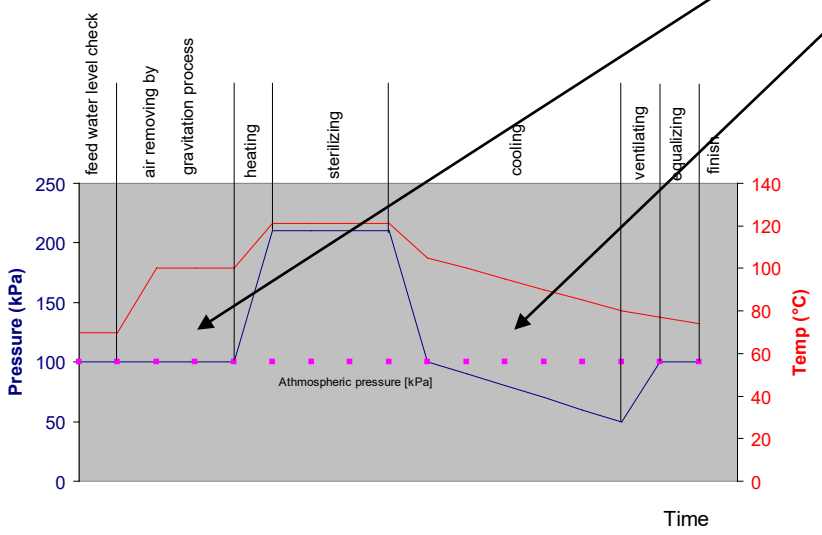
- basic unit is adequate
- the bigger the amount of liquids, the more recommendable is a re-cooling system
- program
  - Liquid waste
  - or all other liquid programs

→ Laboklav 25B & M
→ Laboklav 55-195B, M, MS, MSL

# Sterilizing goods

## Mixed fractions – solids and amounts of liquids >0,5l

Liquid waste
(liquid program)




- de-aeration by gravitation
- passive re-cooling
  - re-cooling system shorten batch time
  - the more liquids are sterilised, the more recommendable is a re-cooling system

**Laboklav 25B, M**

**Laboklav 55-195B, M, MS, MSL**

# Sterilization goods

## Big amount of liquid

capacity up to
100 litres of liquid

**Laboklav Wastewater**

# Thank you for your attention!