



# Putting some juice on your lectures and workshops on sterilization

## A blend of methods



STERILTEKNISKA  
FÖRENINGEN

# Sterildagarna 2022

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Stockholm, Sterildagarna 26-10-2022



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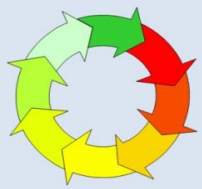
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# Putting some juice on your lectures and workshops on sterilization

## A blend of methods



- Training of CSSD staff and technicians: focus on developing world
- Challenge: Sterilization, an abstract topic about invisible life
- Experience: workshops and lectures
- Initial: traditional methods: books and PowerPoints
- Birth of the Swedish edition of the book
- Need for visualization and experiences
  - Practical experiments related to various steps of sterile supply cycle
- Future: New media: e-books and e-learning
- Way forward: need for follow up.







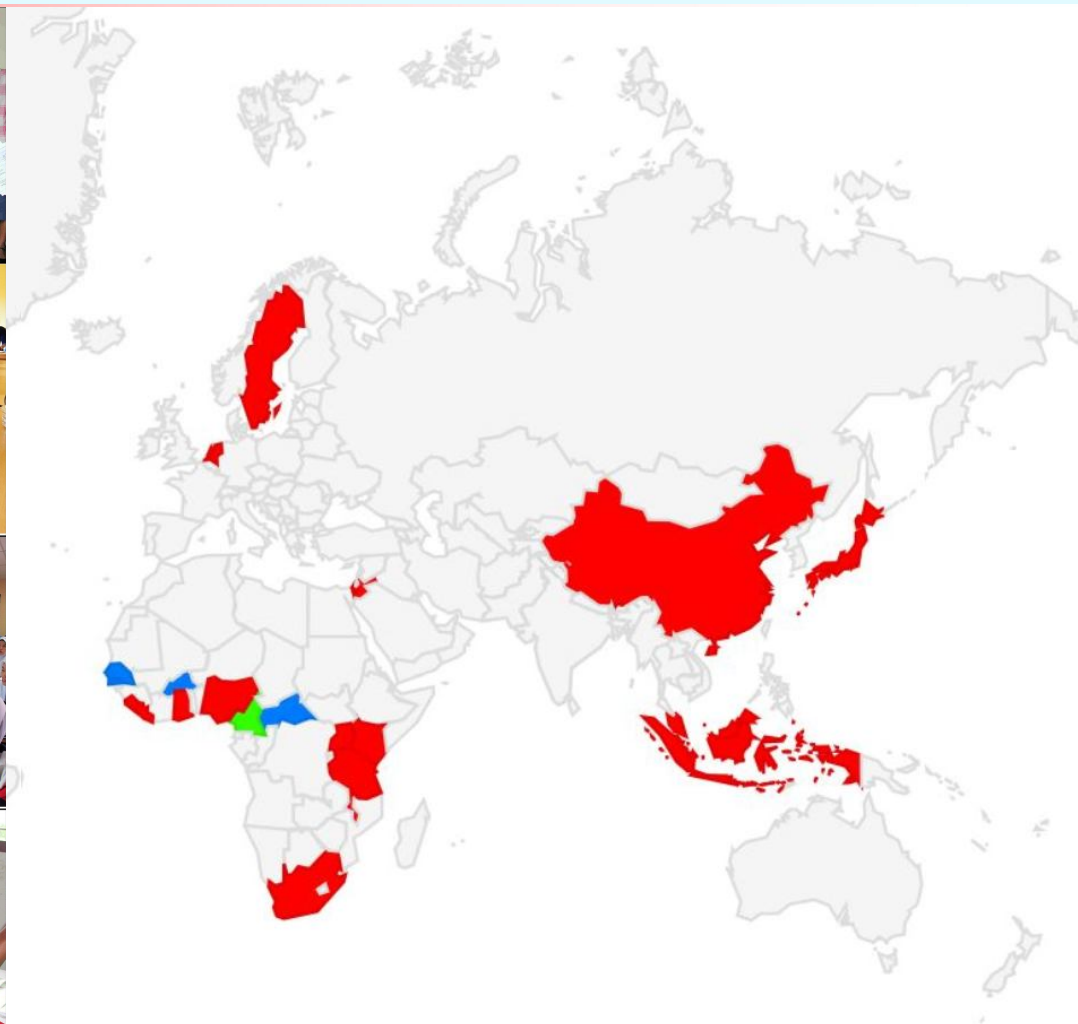
# Lectures and workshops in many locations



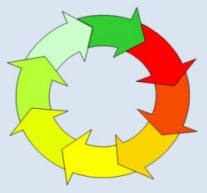




# Lectures and workshops in many locations in 21 countries







# Need for visualization and experience

## Topics are invisible and abstract

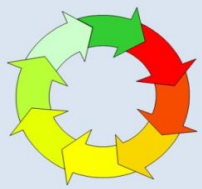
- Deal with invisible life that needs to be inactivated
- Abstract concepts of sterility, disinfection and cleanliness
- Processes take place in closed vessels

## Typical questions

- Where are these invisible micro-organisms?
- How can they spread?
- What is most effective for to stop spreading
- Why is surface tension of water impeding adequate cleaning?
- What are those non-condensable gases?
- Why is air in a steam sterilizer a problem?
- How to make steam at an adequate temperature to assure sterilization?
- Why the heck a vacuum is used for drying the load?
- What actually happens in that sterilizer?
- And knowing all these, how to make all this information available to a worldwide audience?
- How to train our technicians?
- Often very limited resources for training related to sterile supply!







# Need for visualization: Traditional methods: Textbook



174



a. An instrument set wrapped in nonwoven b. Individual instruments in sealed pouch

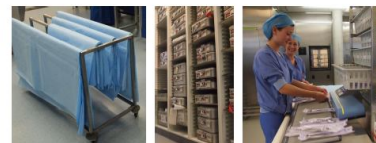
Figure 9.4 - Examples of Sterile Barrier Systems

Examples of sterile barrier systems: two layers of paper, two layers of nonwoven sheets, single or double laminated film pouch, paper bag or a rigid sterilisation container with adequate filter(s).

## 9.2.2 Preformed Sterile Barrier Systems (PSBS)

Products are on the market that are prepared, or pre-formed, to be used as sterile barrier system. For such products an additional action(s), such as folding, cutting, filling and sealing is still needed to complete the package. Such products are known as *Preformed Sterile Barrier Systems (PSBS)*.

Examples: sheets of paper or nonwoven packaging materials, sterilization containers, laminated pouches etc.



a. The nonwoven sheets for wrapping instrument sets b. Sterilization containers in storage-system c. Sterilization pouches for individual instruments

Figure 9.4 - Examples of preformed sterile barrier systems: PSBS

Packaging of sterile products: SBS 175

**Preformed Sterile Barrier System (PSBS)<sup>88</sup>:**  
Partially assembled sterile barrier system prior to filling and final closure and sealing.

## 9.2.3 Protective packaging<sup>89</sup>

An additional layer can be used to facilitate proper storage and safe transportation to the user. It contains the load in its SBS, e.g. an extra plastic wrapper, bag, cardboard box or container. It offers additional protection against dust and liquids and gives extra mechanical protection, making handling easier. Protective packaging may consist of one or more layers. For example disposable items in their SBS may be packed in a box of 24; as stored in a storage area for distribution. For large scale transportation, a number of such boxes may be packed in a larger cardboard box. Such protective packaging is common for single-use<sup>90</sup> sterile supplies, but also in case locally sterilized packs need to be transported outside the building where sterilization took place or when to be sent to another facility.



Figure 9.6 - a. Single-use sterile items in protective packaging b. Single-use items in their SBS and SBS put inside a plastic transported in a dustcover bag. The cardboard box as dustcover provides an additional protective layer during storage c. An instrument set in its SBS put inside a plastic transported in a dustcover bag. The cardboard box as dustcover provides an additional protective layer during storage

<sup>88</sup> As defined in EN ISO 11607

<sup>89</sup> In former publications and standards, the protective packaging was also referred to as *secondary packaging*

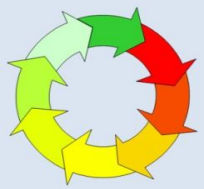
<sup>90</sup> In this context also the term *disposable* is used. However the term *single-use* preferred as it puts the (a positive) emphasis on its functional use, whereas *disposable* puts the fact that it is to be thrown away after use as its major (negative) characteristic.

## Textbook

- Traditional backbone for most education
- First edition 1996.
- Visualization: Lots of illustrations/photos
- However: Need for real life demos, experiences

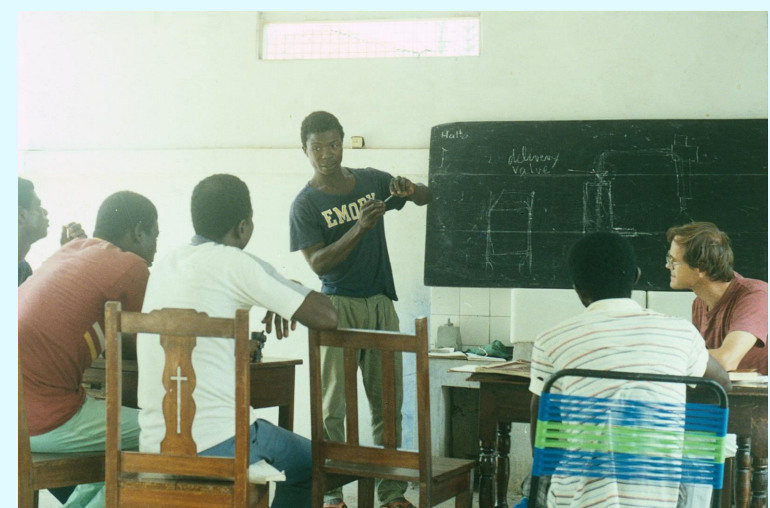
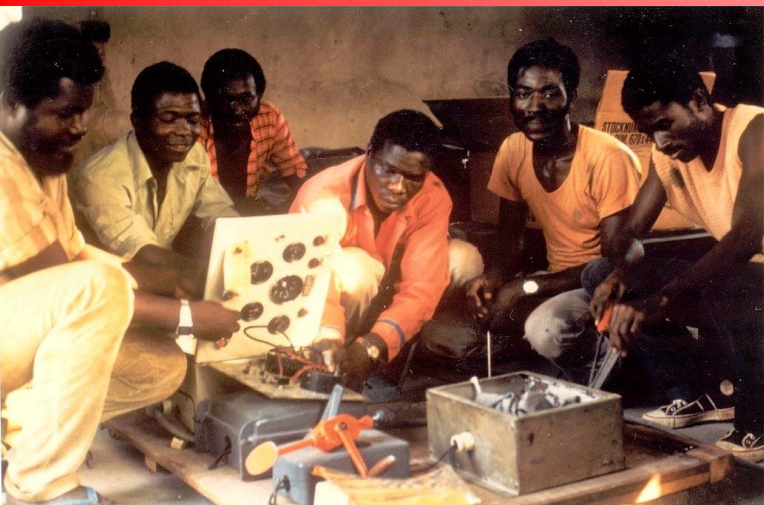






## Birth of the book

- Ghana: 1982-1989: work as medical equipment technician for catholic Mission hospitals all over the country.
- Maintenance team: Covering whole spectrum of equipment
- Initially focus on repairs/installation; later more on education

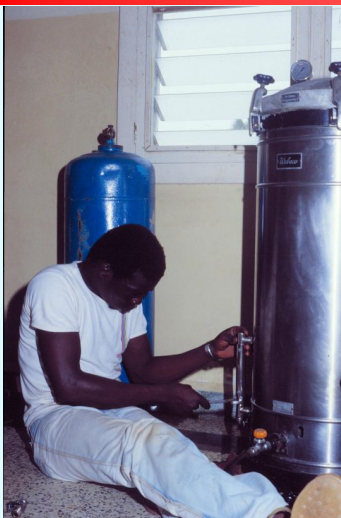




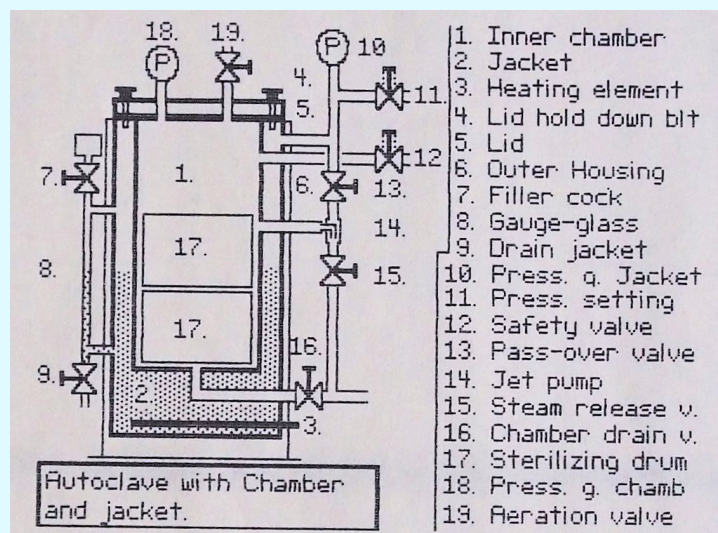
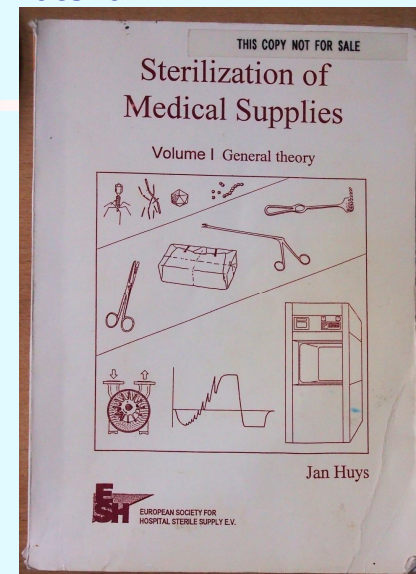


## Birth of the book

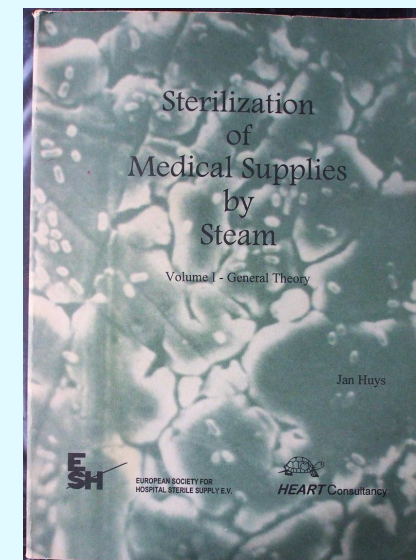
- Also servicing of autoclaves; however no general textbook on sterilization of medical supplies. Choose this subject for making teaching material
- During early 1990's first initial drafts were made
- First edition published: 1995



- Pre-edition (1993)



- 1st-edition (1995)

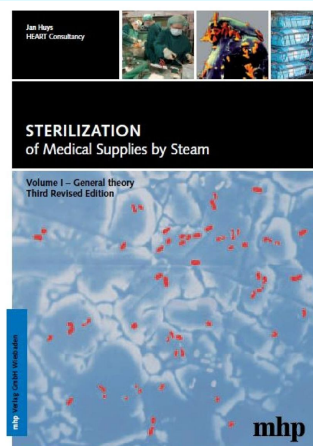






# Birth of the book: Sterilization of Medical Supplies by Steam

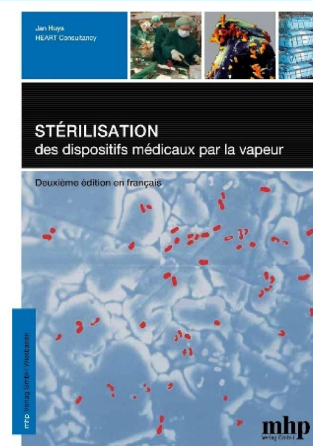
- Available in English, French, Polish, Turkish, Japanese, Spanish, Dutch, Norwegian, Russian, Latvian and



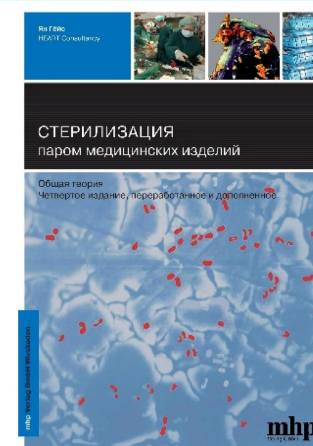
English (3<sup>rd</sup> 2010)



Dutch (4<sup>th</sup> 2021)



French (2<sup>nd</sup> 2016)



Russian (1<sup>st</sup> 2013)



Spanish (3<sup>rd</sup> 2022)



Norwegian (2<sup>nd</sup> 2022)



Polish (1<sup>st</sup> 2011)



Japanese (1<sup>st</sup> 2014)

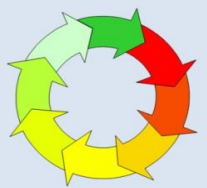


Latvian (1<sup>st</sup> 2021)

The number indicates the latest edition and year of this edition. For information on various editions visit [www.heartware.nl](http://www.heartware.nl)

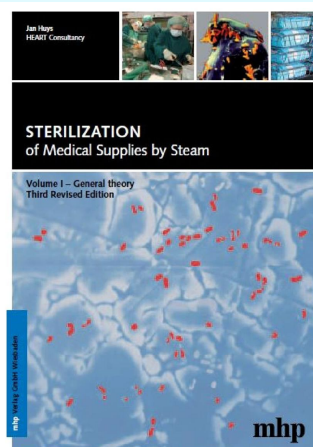
or contact Mr. Jan Huijs, HEART Consultancy, Renkum, The Netherlands: [jh@heartware.nl](mailto:jh@heartware.nl)





# Birth of the book: Sterilization of Medical Supplies by Steam

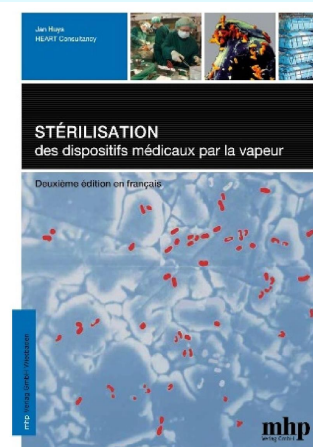
- Available in English, French, Polish, Turkish, Japanese, Spanish, Dutch, Norwegian, Russian, Latvian and
- Since last year: also Swedish!
- In total approx. 18000 books in print
- Yet Preparing publication in Chinese



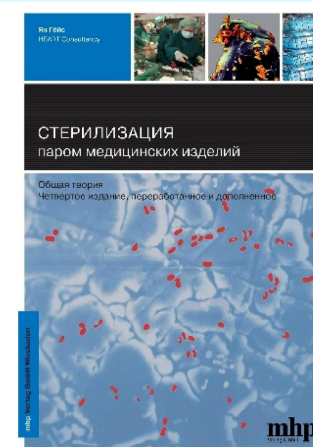
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Dutch (4<sup>th</sup> 2021)



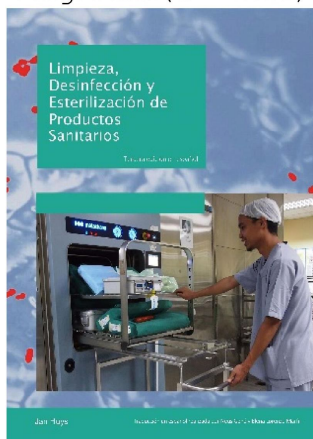
French (2<sup>nd</sup> 2016)



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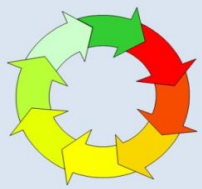
Studiedag 28 november 2013  
Congres- en Erfgoedcentrum Lamot • Guldenstraat 18 • 2800 Mechelen

## Programma

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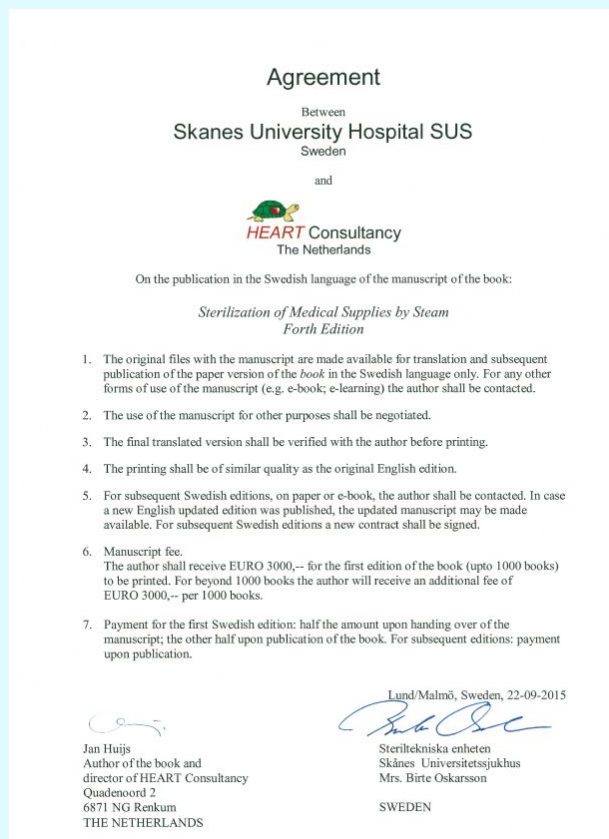






# Book: Sterilization of Medical Supplies by Steam

- Hundreds of e-mails; days hard work translating text and illustrations
- Choosing Printer; finalizing manuscript
- 2021 Publication of the book!







# Need for visualization: Traditional methods

## PowerPoints

- Presentations adapted to local situation: context, equipment and practices
- Remains abstract/passive



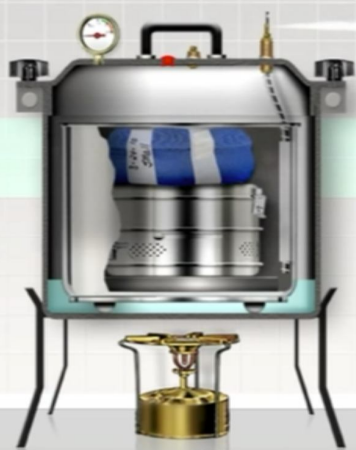
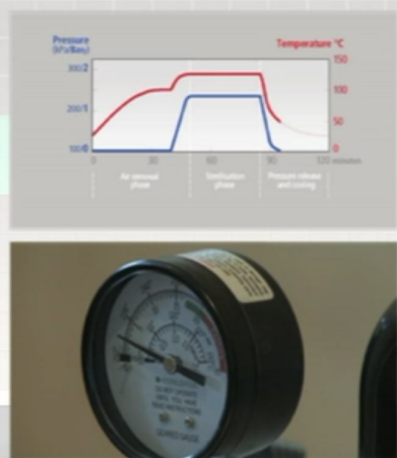




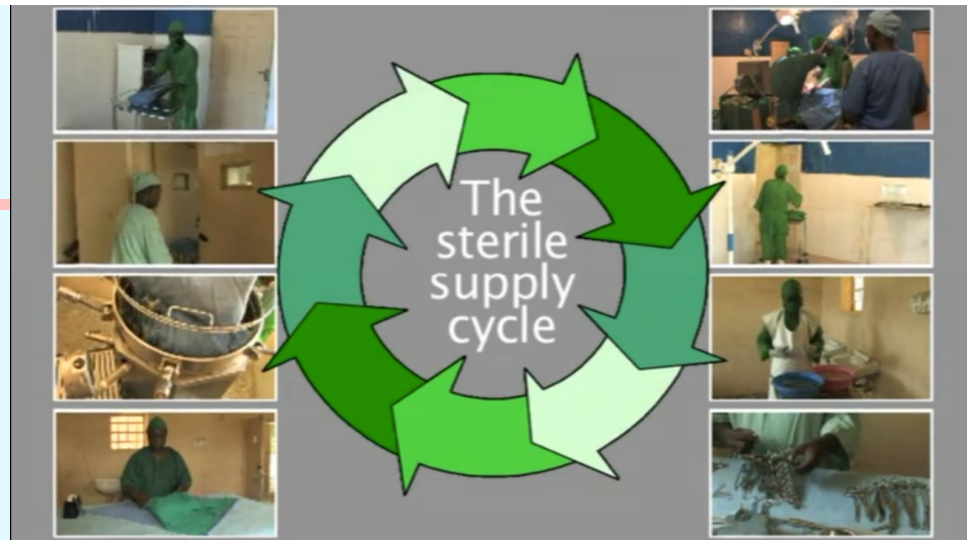
# Need for visualization: Traditional methods

## Educational videos

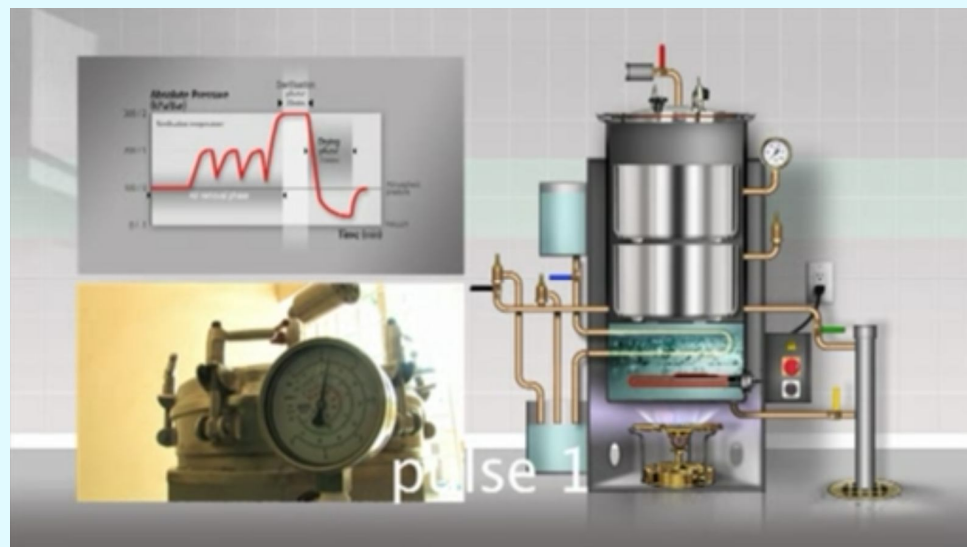
- Videos adapted to local situation: context, equipment and practices. Example setting: Northern Nigeria
- Show in short time the essentials of the sterile supply cycle
- Instructions for use and user maintenance of their equipment.
- Remains abstract/passive



- Instructions for use: 39 litre manual operated sterilizer



- General introduction to sterile supply: The sterile supply cycle



- Instructions for use: 90 ltr manual operated vertical sterilizer



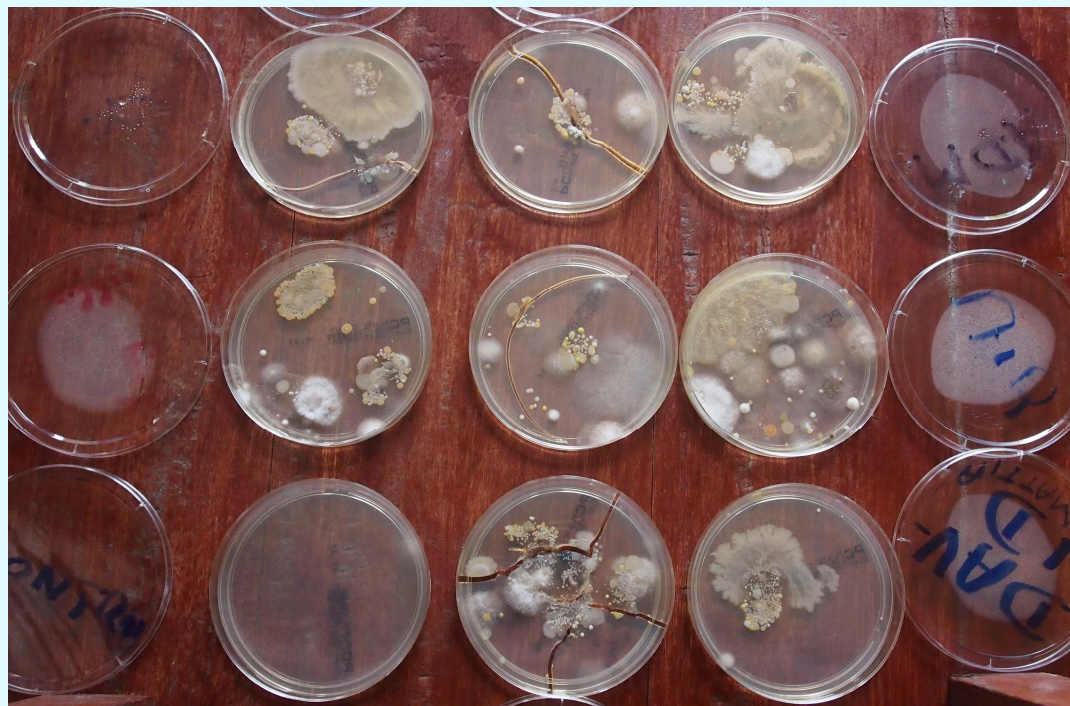


# Making it visible: Teaching aids

Topic: Microbiology

Question: Where are these bugs?

- Petri dish with culture medium
- Taking samples: e.g. fingertip, coughing, sputum, table to, free air
- Time. Usually no incubator needed ☺







## Making it visible: Teaching aids

**Topic:** Infection control

**Question:** How does disease spread? Why is hand hygiene so important in infection control?

- Fluorescent powder
- UV light







## Making it visible: Teaching aids

Topic: Cleaning

Question: How do I know it is clean?

- UV light
- Fluorescent powder or gel





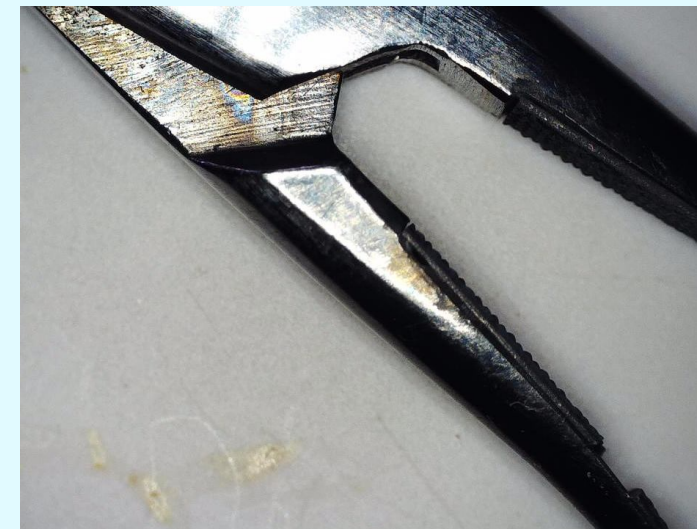
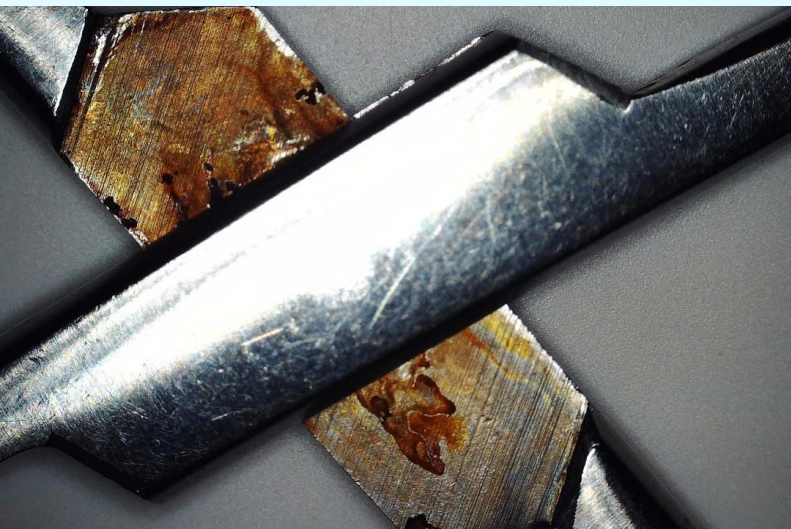


# Making it visible: Teaching aids

Topic: Cleaning

Question: How do I know it is clean?

- USB Microscope/software
- Laptop/computer





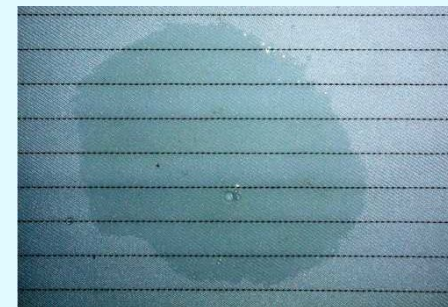


# Making it visible: Teaching aids

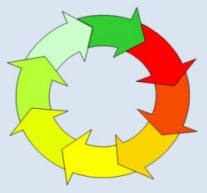
## Topic: Cleaning

**Question:** What is a surfactant? What is its function?

- Syringe with water
- Syringe with fluid soap
- Non-woven sheet or other hydrophobic tissue





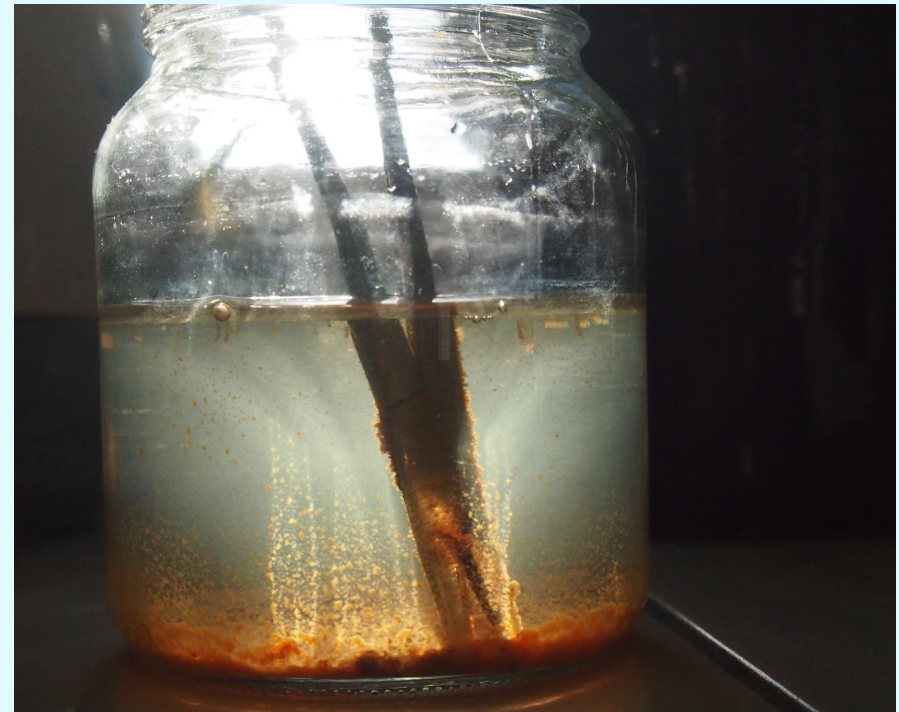
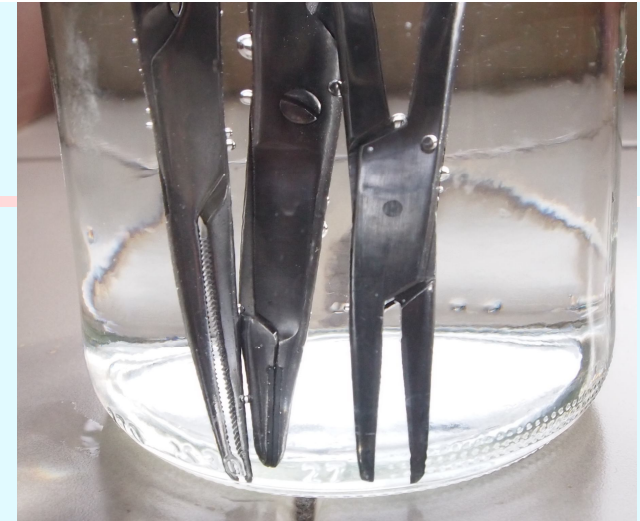


## Making it visible: Teaching aids

Topic: cleaning

Question: Stainless steel cannot rust?

- Glass with salty water
- Some surgical instruments; also some hinged







## Making it visible: Teaching aids

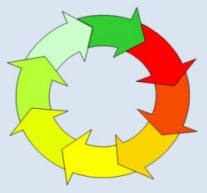
**Topic:** steam sterilization; physics of steam

**Question:** Why steam for sterilization?

- Steam demonstration kit
  - Flask, stopper with passages, pressure gauge, vacuum pump, thermometer, hot plate, tubing







# Making it visible: Teaching aids

Topic: steam sterilization; physics of steam

Question: What is steam? How is steam made?

- Steam demonstration kit





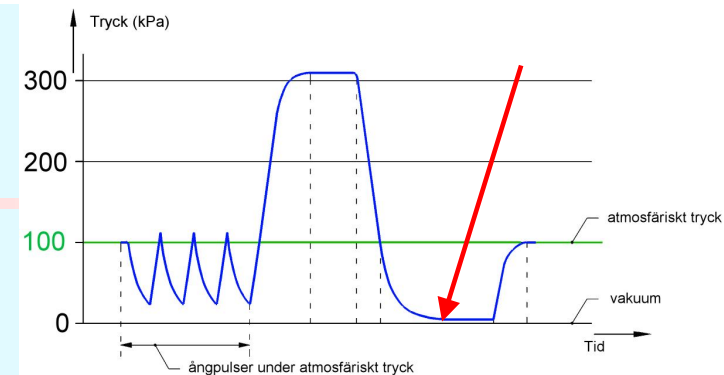


## Making it visible: Teaching aids

**Topic:** steam sterilization; operation of sterilizer: drying

**Question:** Why a vacuum for drying in a steam sterilizer?

- Steam demonstration kit.







# Making it visible: Teaching aids

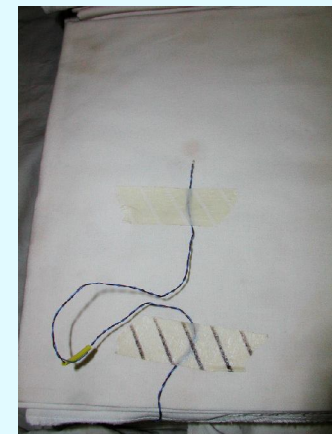
**Question:** What happens inside a sterilizer? Real time

**Topic:** steam sterilization

- Thermocouple entry for 2 channels; can be with pressure gauge; air inlet
- Thermocouples (K-Type)
- 2 channel digital thermometer
- Bowie and Dick textile pack; with indicator sheets
- Indicator tape



| Time | T <sub>1</sub> | T <sub>2</sub> | T <sub>3</sub> | P <sub>1</sub> | P <sub>2</sub> | Time | T <sub>1</sub> | T <sub>2</sub> | T <sub>3</sub> | P <sub>1</sub> | P <sub>2</sub> |
|------|----------------|----------------|----------------|----------------|----------------|------|----------------|----------------|----------------|----------------|----------------|
| 3:03 | 33.0           | 32.7           | 1.34           | 0              | 0              | 3:36 | 106.9          | 33.2           | 102.8          | 0.15           | 0.4            |
| 3:10 | 33.2           | 32.8           | 1.34           | 0              | 0              | 3:37 | 110.9          | 33.3           | 107.2          | 0.025          | 0              |
| 3:12 | 33.0           | 32.8           | 1.34           | 0              | 0              | 3:38 | 115.2          | 33.4           | 111.7          | 0.4            | 0.7            |
| 3:13 | 32.6           | 32.8           | 1.34           | 0              | -0.1           | 3:39 | 119.2          | 33.4           | 115.7          | 0.5            | 0.9            |
| 3:14 | 32.6           | 32.8           | 29.7           | -0.02          | -0.1           | 3:40 | 123.3          | 33.5           | 119.9          | 0.7            | 1.2            |
| 3:15 | 32.6           | 32.8           | 29.7           | -0.1           | -0.15          | 3:41 | 127.5          | 33.6           | 123.8          | 0.8            | 1.5            |
| 3:16 | 32.8           | 32.8           | 29.8           | -0.1           | -0.2           | 3:42 | 130.6          | 33.7           | 126.4          | 1              | 1.7            |
| 3:17 | 33.2           | 32.8           | 30             | -0.1           | -0.1           | 3:43 | 130.9          | 33.9           | 129.9          | 1.1            | 2              |
| 3:18 | 36.1           | 32.9           | 31.1           | -0.1           | 0              | 3:44 | 136.1          | 34.0           | 133.3          | 1.2            | 2.2            |
| 3:19 | 40.9           | 33.9           | 35.6           | -0.05          | 0              | 3:45 | 139.7          | 34.1           | 136.0          | 1.3            | 2.5            |
| 3:20 | 45.1           | 32.9           | 39.9           | 0              | 0.05           | 3:46 | 139.2          | 34.2           | 135.0          | 1.4            | 2.5            |
| 3:21 | 52.7           | 33.0           | 45.5           | 0              | 0.1            | 3:47 | 138.3          | 34.4           | 135.1          | 1.4            | 2.4            |
| 3:22 | 70.1           | 33.0           | 61.7           | 0.05           | 0.2            | 3:48 | 138.7          | 34.5           | 135.2          | 1.4            | 2.3            |
| 3:23 | 80.4           | 33.1           | 73.8           | 0.1            | 0.2            | 3:49 | 139.4          | 34.6           | 135.6          | 1.4            | 2.4            |
| 3:24 | 89.2           | 33.1           | 81.6           | 0.1            | 0              | 3:50 | 139.8          | 34.9           | 135.9          | 1.4            | 2.4            |
| 3:25 | 80.5           | 32.0           | 73.8           | 0              | -0.2           | 3:51 | 138.3          | 35.1           | 134.9          | 1.4            | 2.4            |
| 3:26 | 76.4           | 32.9           | 76.4           | -0.1           | -0.1           | 3:52 | 138.4          | 35.3           | 134.3          | 1.4            | 2.3            |
| 3:27 | 86.4           | 33.0           | 81.3           | -0.05          | -0.1           | 3:53 | 139.1          | 35.7           | 135.3          | 1.4            | 2.4            |
| 3:28 | 93.0           | 33.1           | 85.0           | 0              | 0.2            | 3:54 | 139.8          | 36.2           | 135.8          | 1.4            | 2.5            |
| 3:29 | 98.7           | 33.1           | 96.9           | 0.1            | 0.2            | 3:55 | 138.3          | 36.7           | 134.9          | 1.4            | 2.4            |
| 3:30 | 103.0          | 33.1           | 99.5           | 0.1            | 0.3            | 3:56 | 138.4          | 37.4           | 134.7          | 1.4            | 2.3            |
| 3:31 | 101.3          | 33.1           | 97.2           | 0.2            | 0              | 3:57 | 135.1          | 38.0           | 132.1          | 1              | -0.2           |
| 3:32 | 84.5           | 33.0           | 89.0           | 0              | -0.2           | 3:58 | 84.9           | 39.0           | 85.2           | 0.7            | -0.3           |
| 3:33 | 152.3          | 33.0           | 83.5           | -0.1           | -0.2           | 3:59 | 83.9           | 40.6           | 79.7           | 0.4            | -0.3           |
| 3:34 | 95.1           | 33.1           | 92.0           | -0.05          | 0.1            | 4:00 | 87.6           | 43.8           | 77.5           | 0.3            | -0.3           |
| 3:35 | 102.1          | 32.2           | 97.2           | 0.05           | 0.2            |      |                |                |                |                |                |







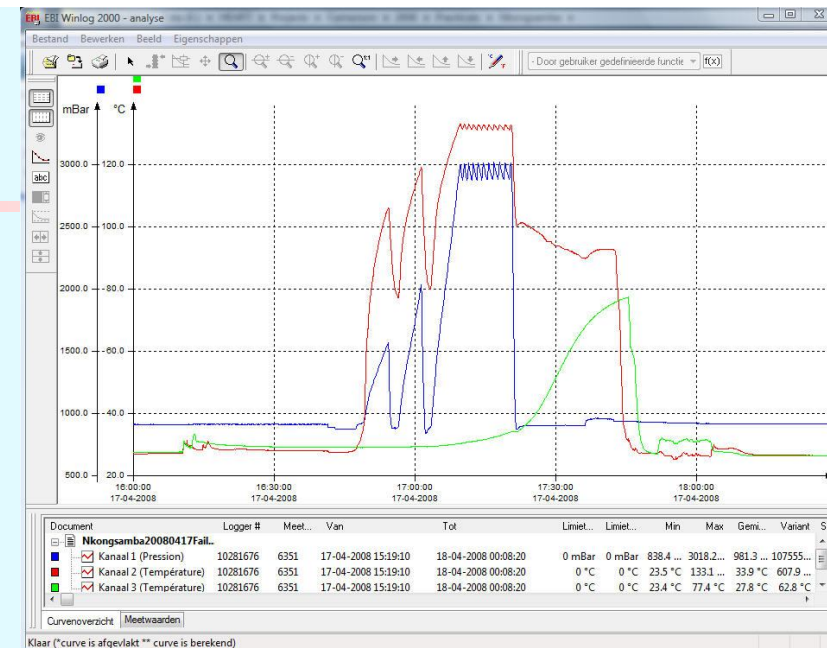
# Making it visible: Teaching aids

**Topic:** steam sterilization

**Question:** What happens inside a sterilizer?

Real time. Failing Cycle

- Thermocouple entry for 2 channels; can be with pressure gauge; air inlet
- Thermocouples (K-Type)
- 2 channel digital thermometer
- Bowie and Dick textile pack; with indicator sheets
- Indicator tape







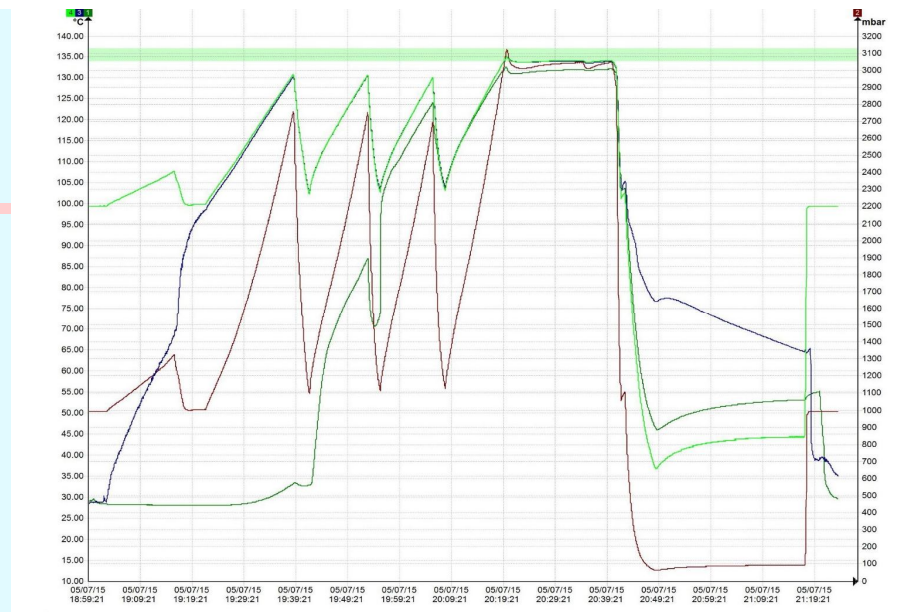
# Making it visible: Teaching aids

## Topic: steam sterilization

Question: What happens inside a sterilizer?

Real time. Successful Cycle

- Thermocouple entry for 2 channels; can be with pressure gauge and air inlet (create fail cycle)
- Thermocouples (K-Type)
- 2 channel digital thermometer
- Bowie and Dick textile pack; with indicator sheets
- Indicator tape







## Making it visible: Teaching aids

**Topic:** steam sterilization

**Question:** What happens inside a sterilizer?

**Evaluation after cycle**

- Set of dataloggers, for pressure and 2 temperatures
- Computer interface; software
- Bowie and Dick textile pack
- Indicator tape
- No need for thermocouple entry connection
- No real time readings





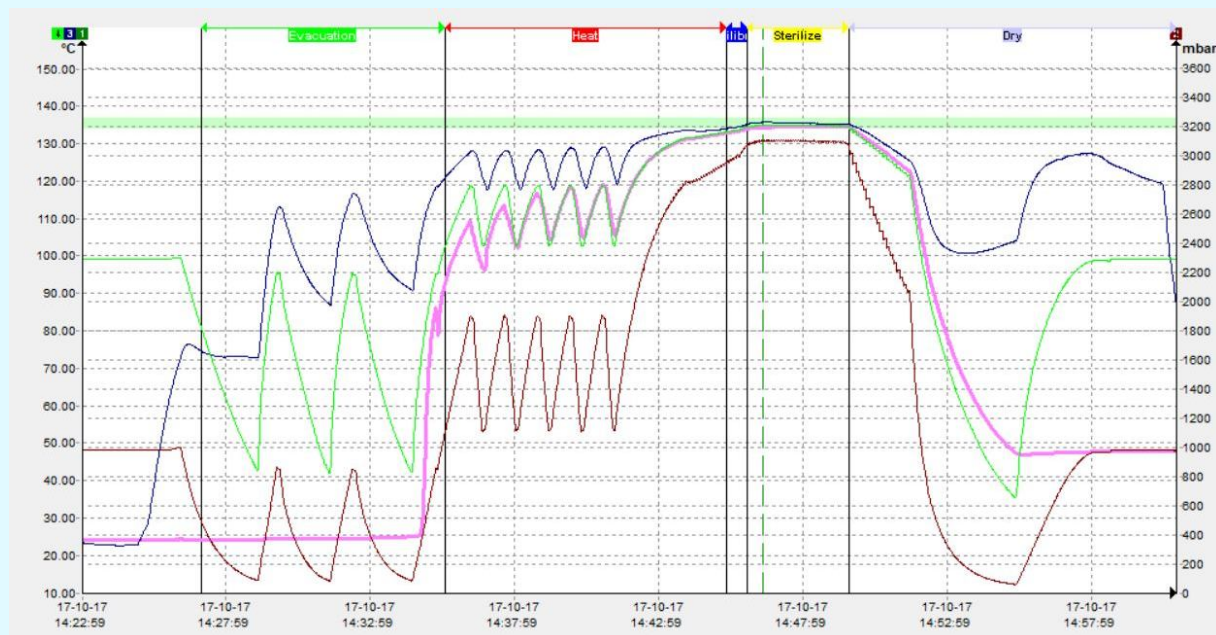


# Making it visible: Teaching aids

**Topic:** steam sterilization

**Question:** What happens inside a sterilizer? Evaluation after cycle

- Set of dataloggers, for pressure and 2 for temperature (chamber; centre of pack)
- Computer interface; software
- Bowie and Dick textile pack
- Indicator tape
- Easy: No need for connecting thermocouple entry to chamber!







**Question:** What happens inside a sterilizer as the process passes?

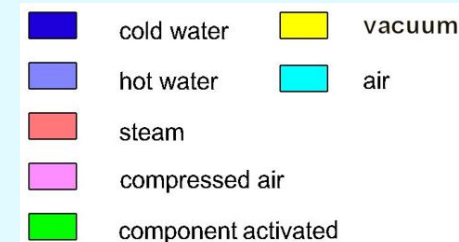
- 
- steam from drawing no. 60-300.12795
- Compressed air 5.0 m³/h 5.0-7.0 barg
- delivery by customer
- Tap water 1.0 m³/h 2.0-5.0 barg
- degassing ELD from drawing no. 60\_300.12795
- feed water to drawing no. 60\_300.12795
- feed water from drawing no. 60\_300.12795
- waste water from drawing no. 60\_300.12795
- emptying from drawing no. 60\_300.12795
- Ablauf DN 25
- Copyright notice: The copyright on this drawing and all enclosures is reserved to Sauter AG at any time. This documentation is personal and entrusted to the consignee. Do not copy this drawing or parts thereof without prior written approval by Sauter AG. Also it is not allowed to make it available to or to hand it over to third parties.
- | Project:          |          | Replacement for: |          | Weight: kg: |     |
|-------------------|----------|------------------|----------|-------------|-----|
| Amman - Jordanien |          | -                |          | -           |     |
| Form:             | A2       | Scale:           | 1:1      | Drawn by:   | NEB |
| checked:          | 03.06.08 | checked:         | 03.06.08 | checked:    | ABO |
| revision:         | -        | revision:        | -        | revision:   | -   |
| sheet:            | -        | sheet:           | -        | sheet:      | -   |
- Bellmed** Belimed Sauter AG  
CH-8503 Rüschlikon  
Tel.: +41(71)544 85 60  
Fax: +41(71)544 85 60
- Drawing number: 60\_300.12794





**Question:** What happens inside a sterilizer as the process passes?

- 
- The diagram illustrates a steam sterilization system. A central red cylindrical vessel is labeled "Sterilizing chamber". Below it is a blue cylindrical vessel labeled "Jacket". The system includes various pipes, valves, and sensors, numbered 1 through 40. A pressure graph on the right shows pressure in bar over time, with peaks labeled 1 through 6. The graph is titled "Pressure (bar)" and "air removal". The pressure starts at 0, rises to a peak of approximately 2.2 bar (labeled 1), drops to 0 (labeled 2), rises to a second peak of approximately 2.2 bar (labeled 3), drops to 0 (labeled 4), rises to a third peak of approximately 2.2 bar (labeled 5), and finally drops to 0 (labeled 6). The graph is labeled "air removal" and "Pressure (bar)".







## Making it visible: process simulation. Example. Operation of autoclave (Belimed MST-V)







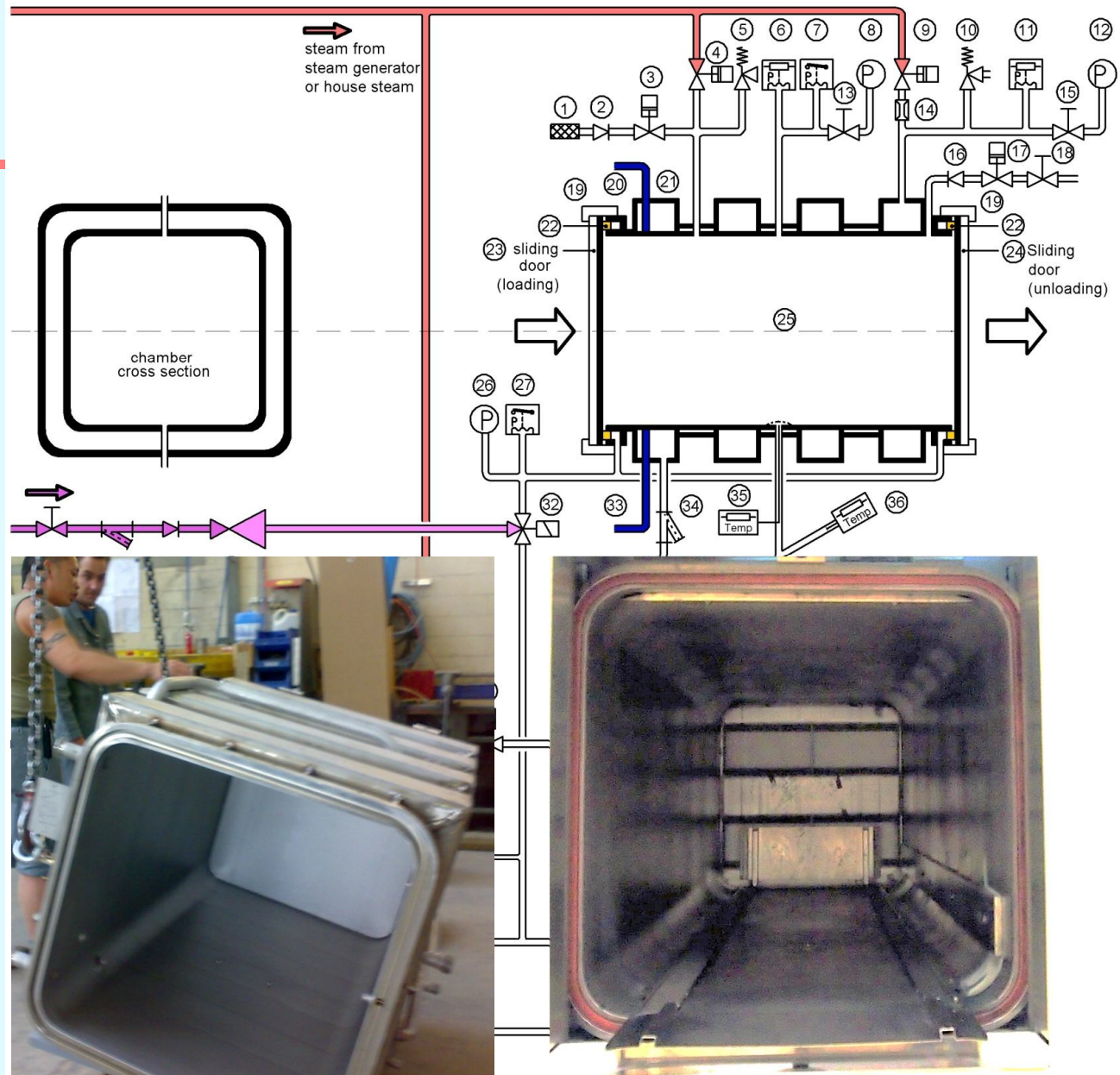
# Process simulations

## Hospital sterilizer

Features:

Belimed MST-V

- Horizontal chamber
- Jaqueted/ double wall
- Double door
- Vertically sliding doors
- Vacuum by water ring pump
- Microprocessor control
- With steam generator







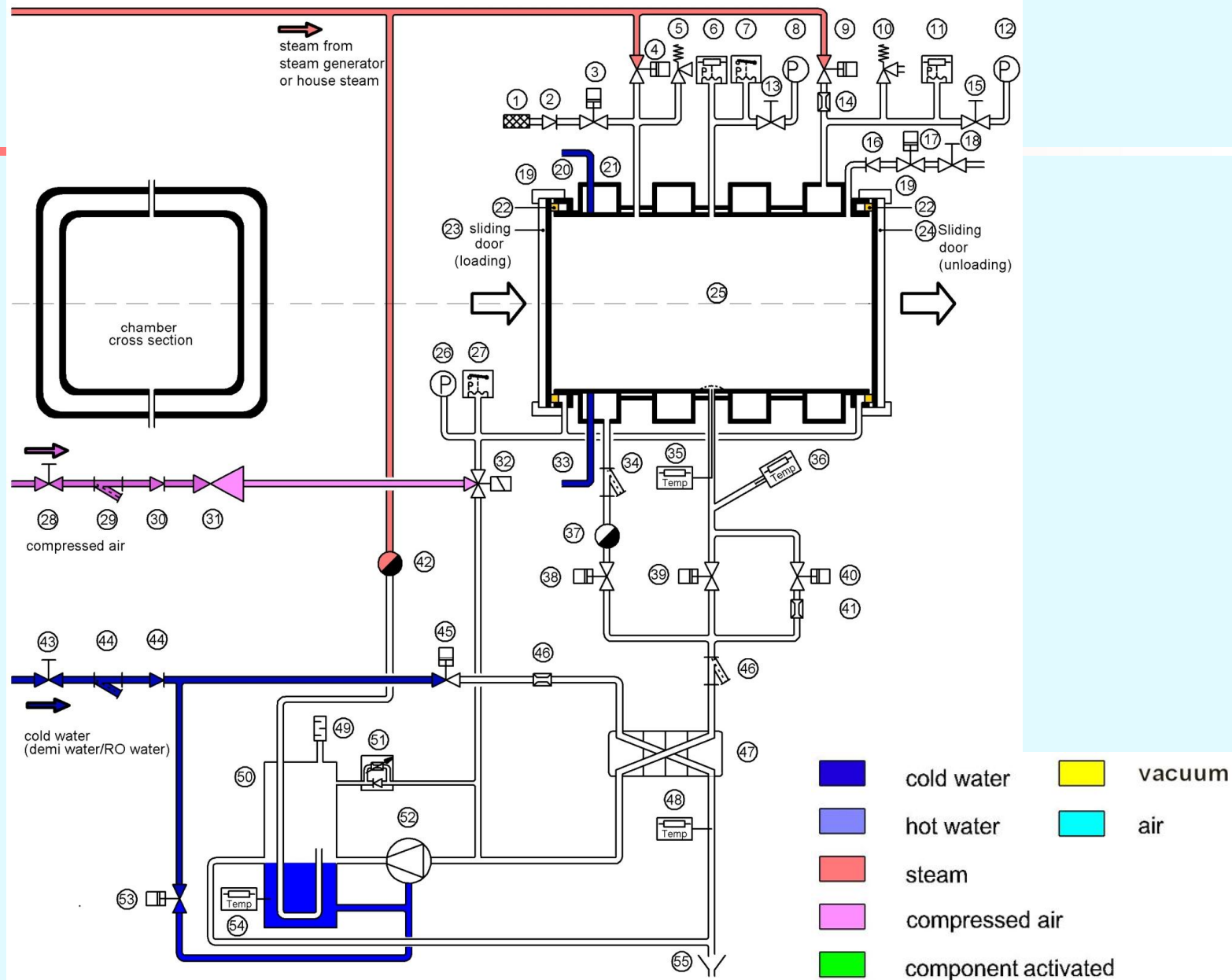
# Process simulations

## Hospital sterilizer

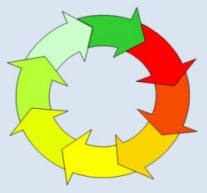
### Features:

#### Belimed MST-V

- Horizontal chamber
- Jacketed/double wall
- Double door
- Vertically sliding doors
- Vacuum by water ring pump
- Microprocessor control
- With steam generator



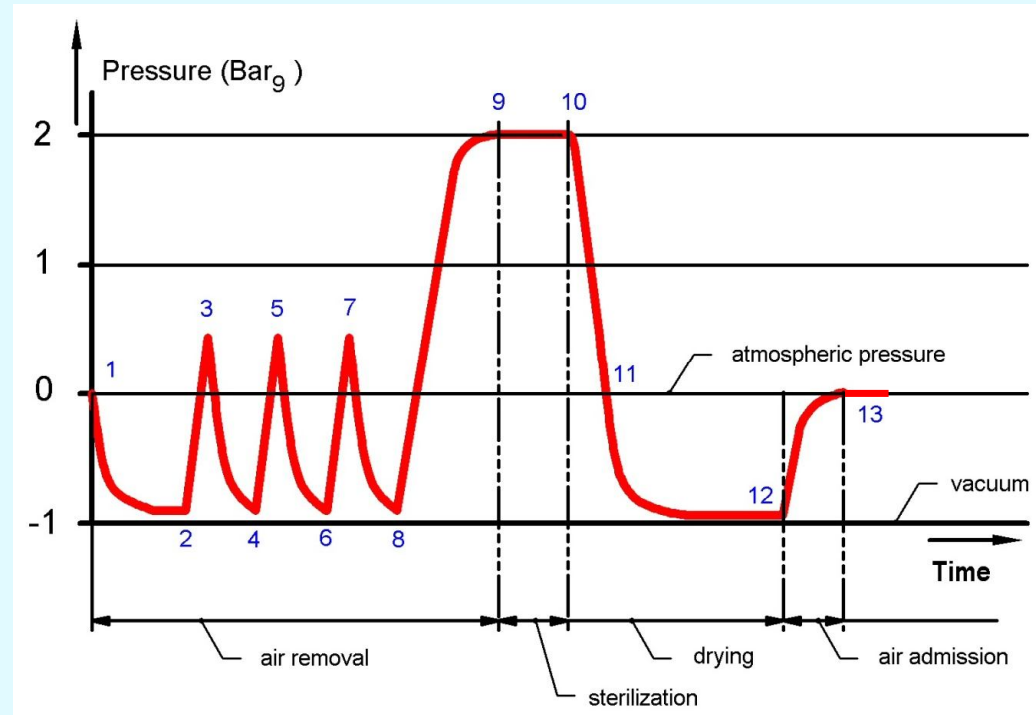




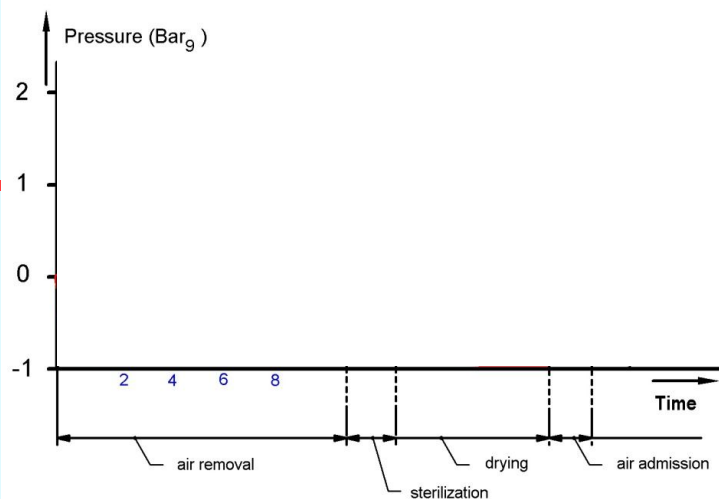
# Making it visible: process simulation. Example

## Sample Process

- Air removal
  - Vacuum followed by 3 pulses: -0.9 bar +0.5 bar.
- Sterilisation: 134°C for 3 min
- Drying: 15 min
- Air admission

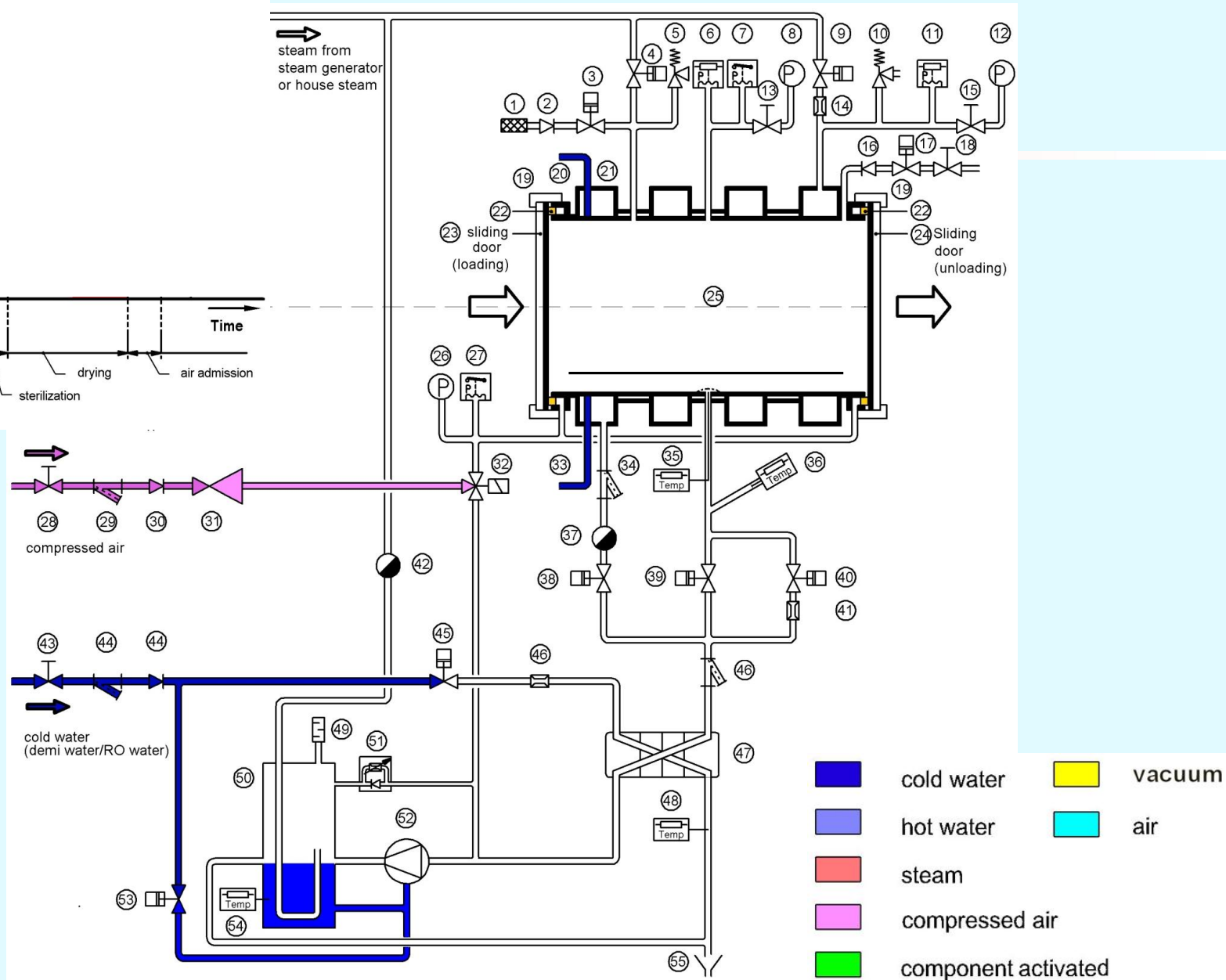




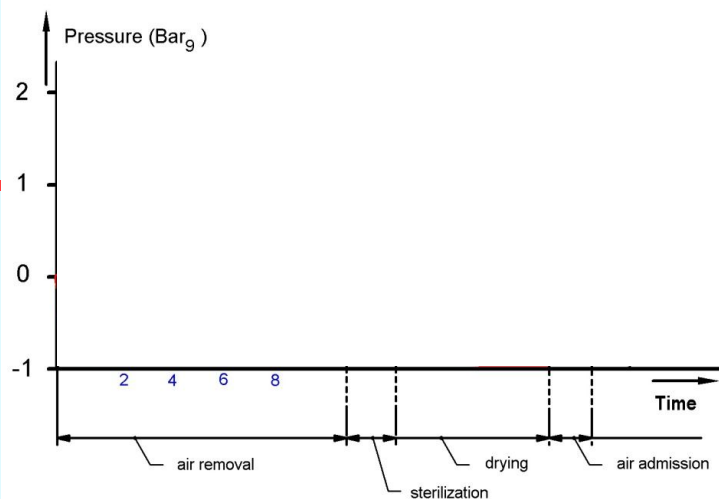


## Autoclave off

- Supplies:
  - Water
  - Compressed air

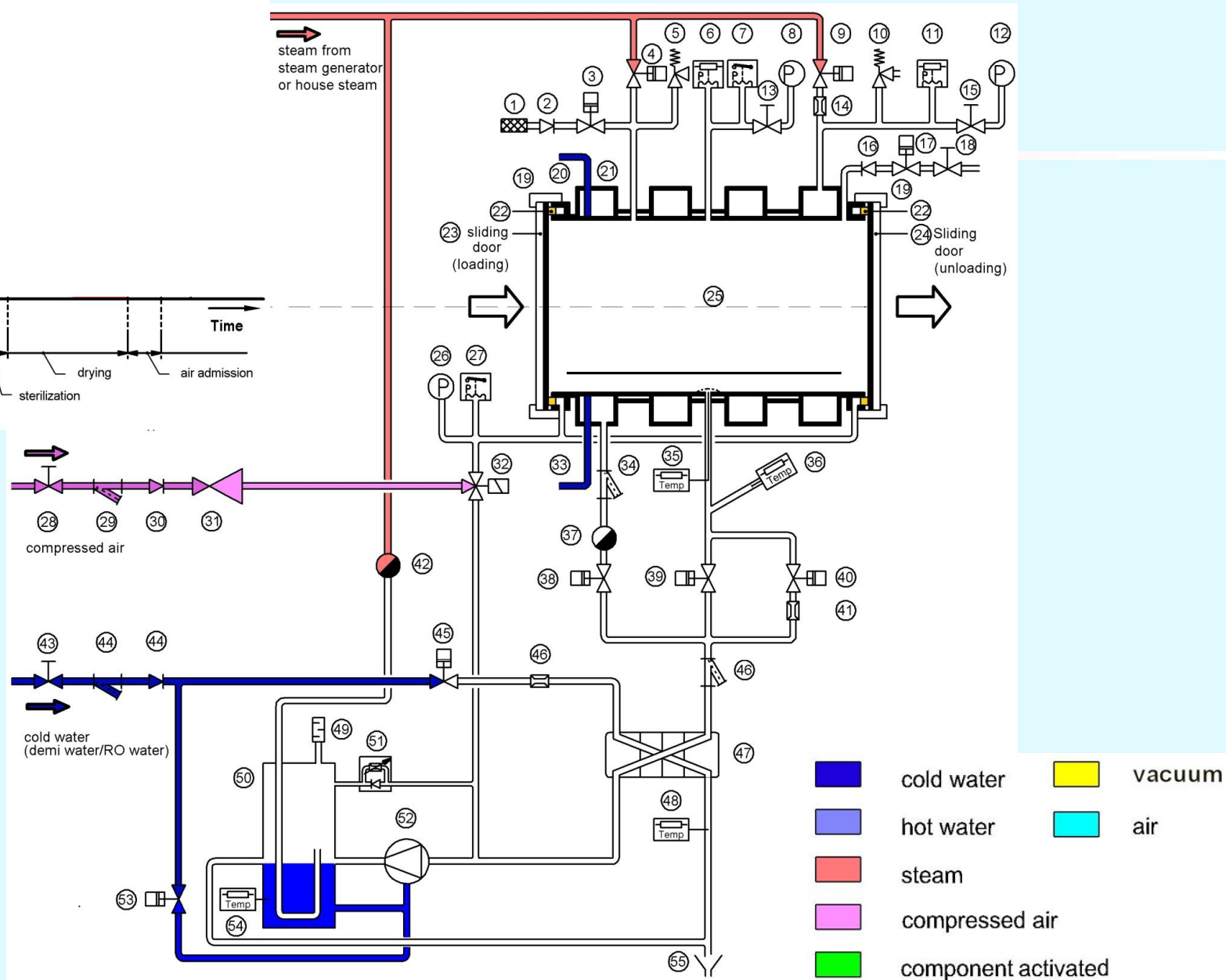




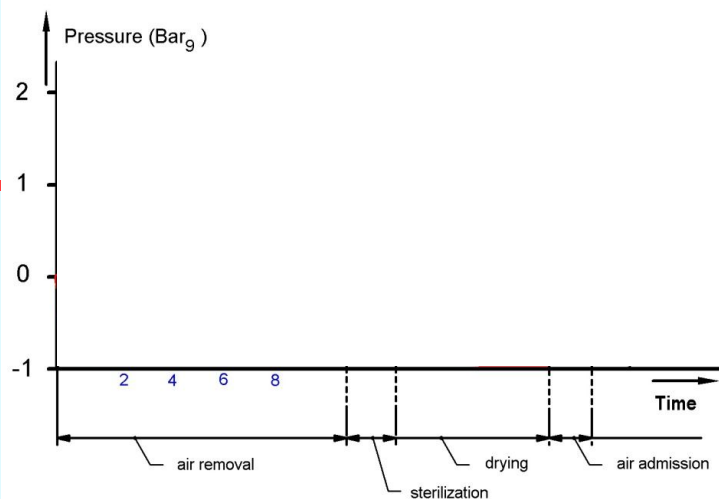


## Autoclave on

- Steam generator on

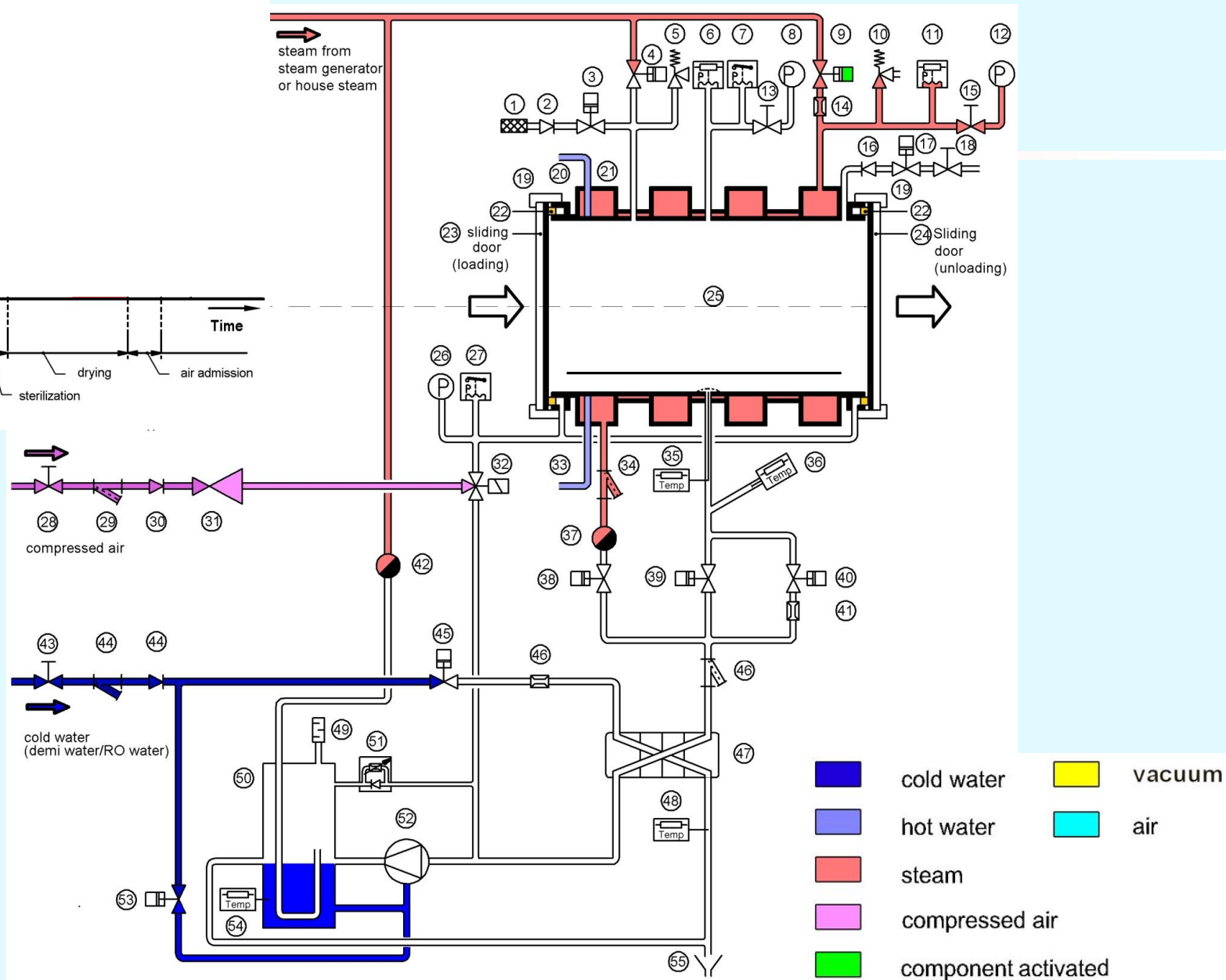




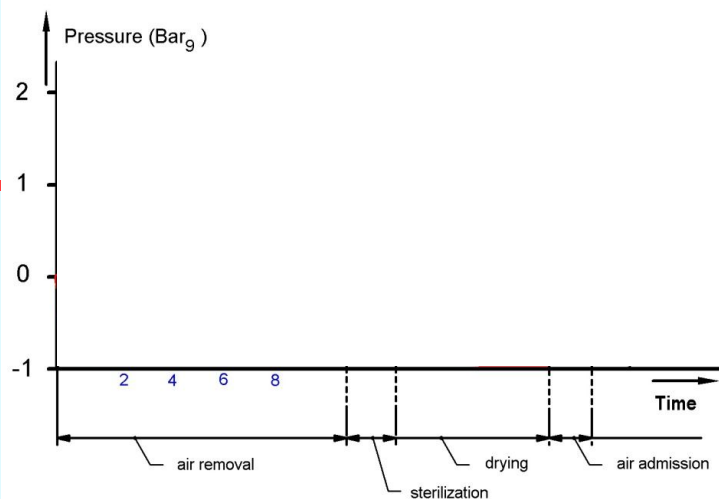
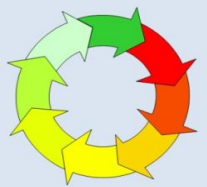


## Standby

- Steam to chamber

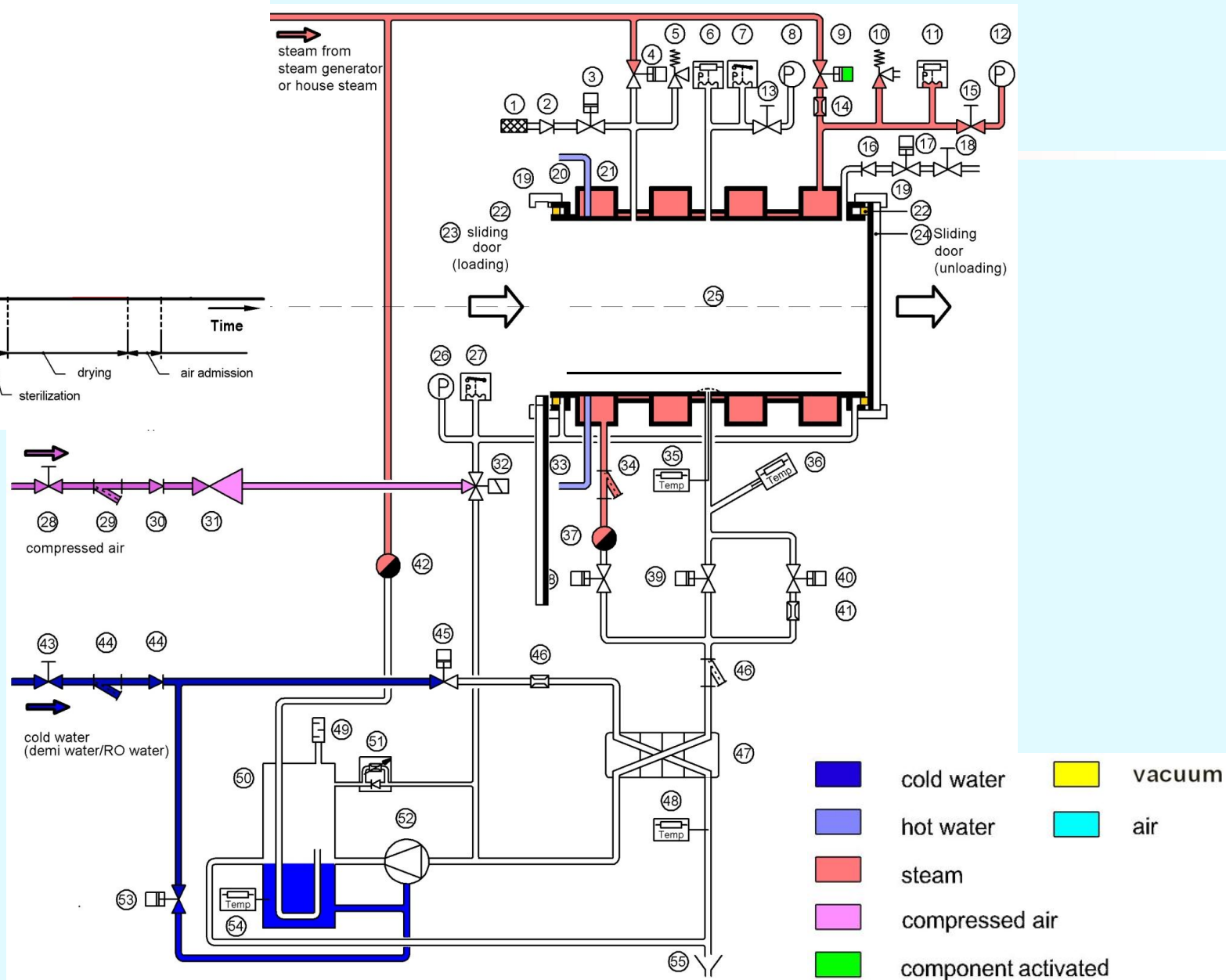






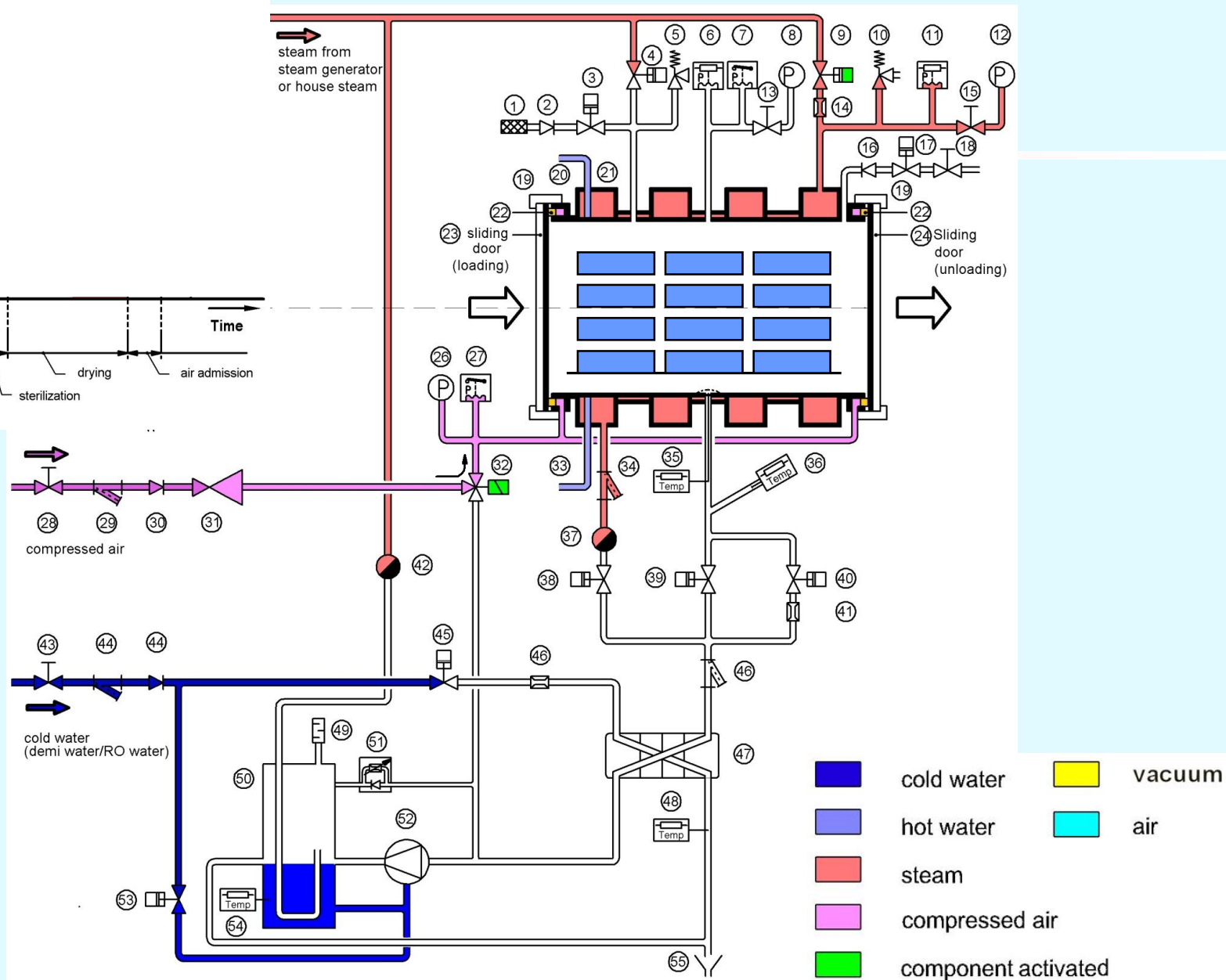
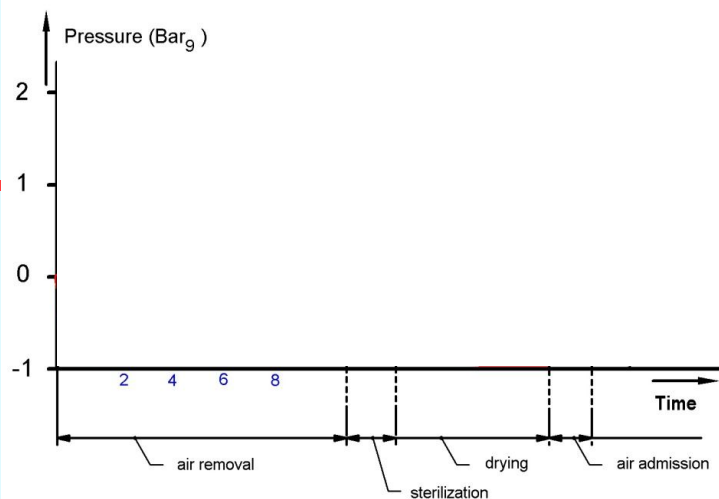
## Preparation

- Door open for loading

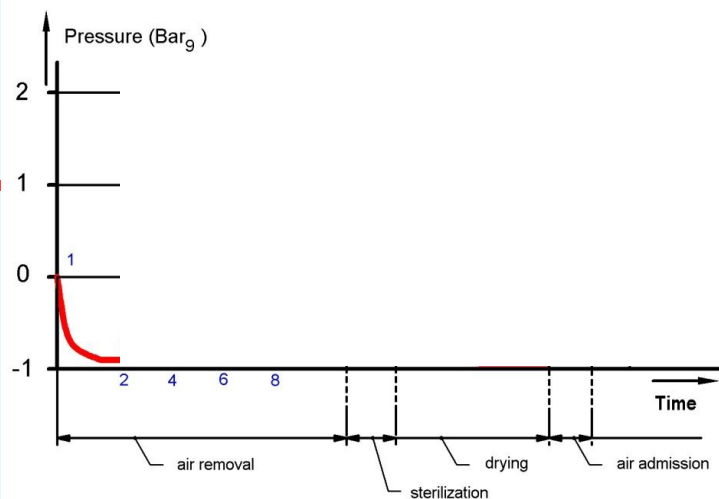
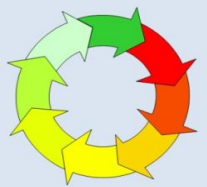






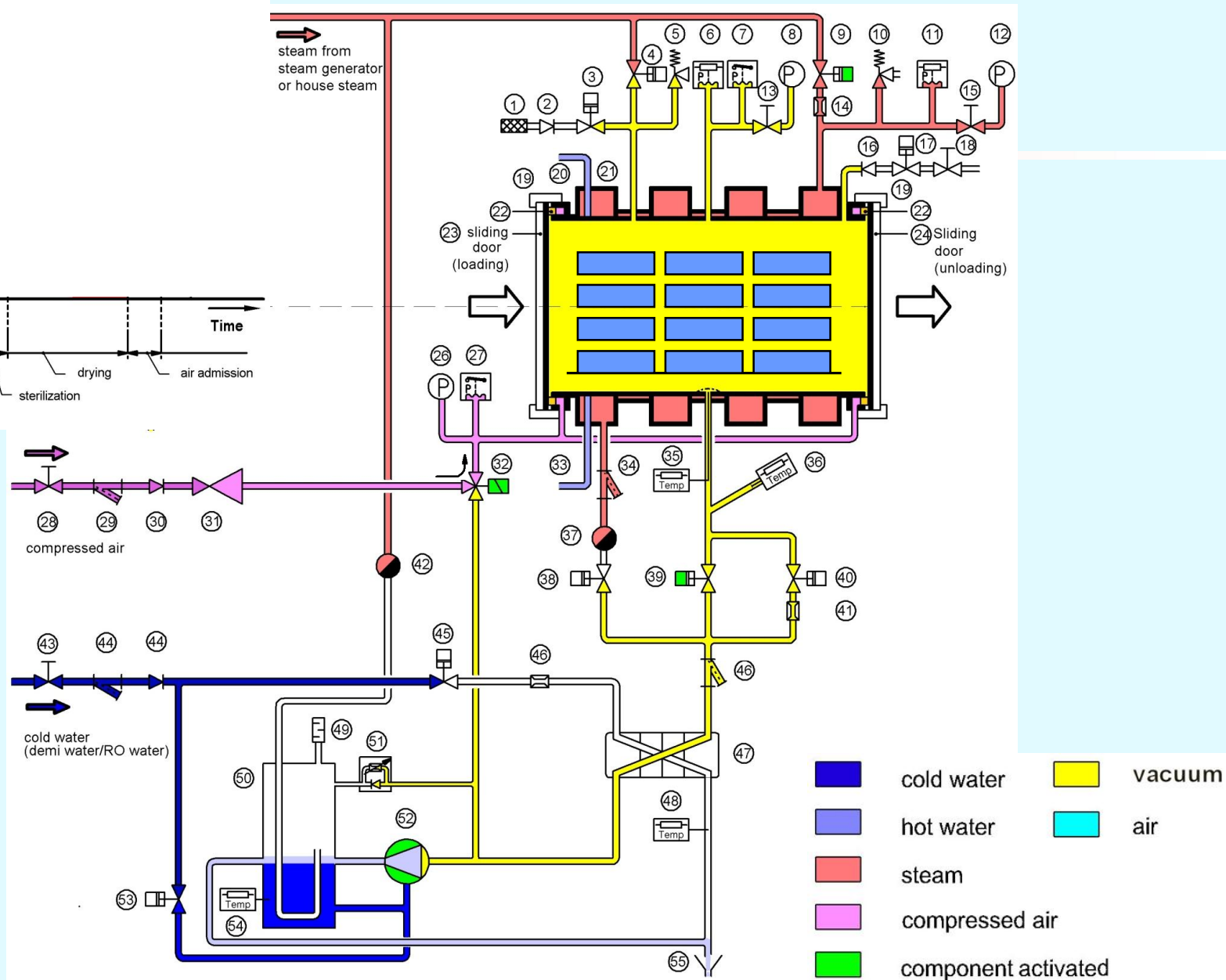


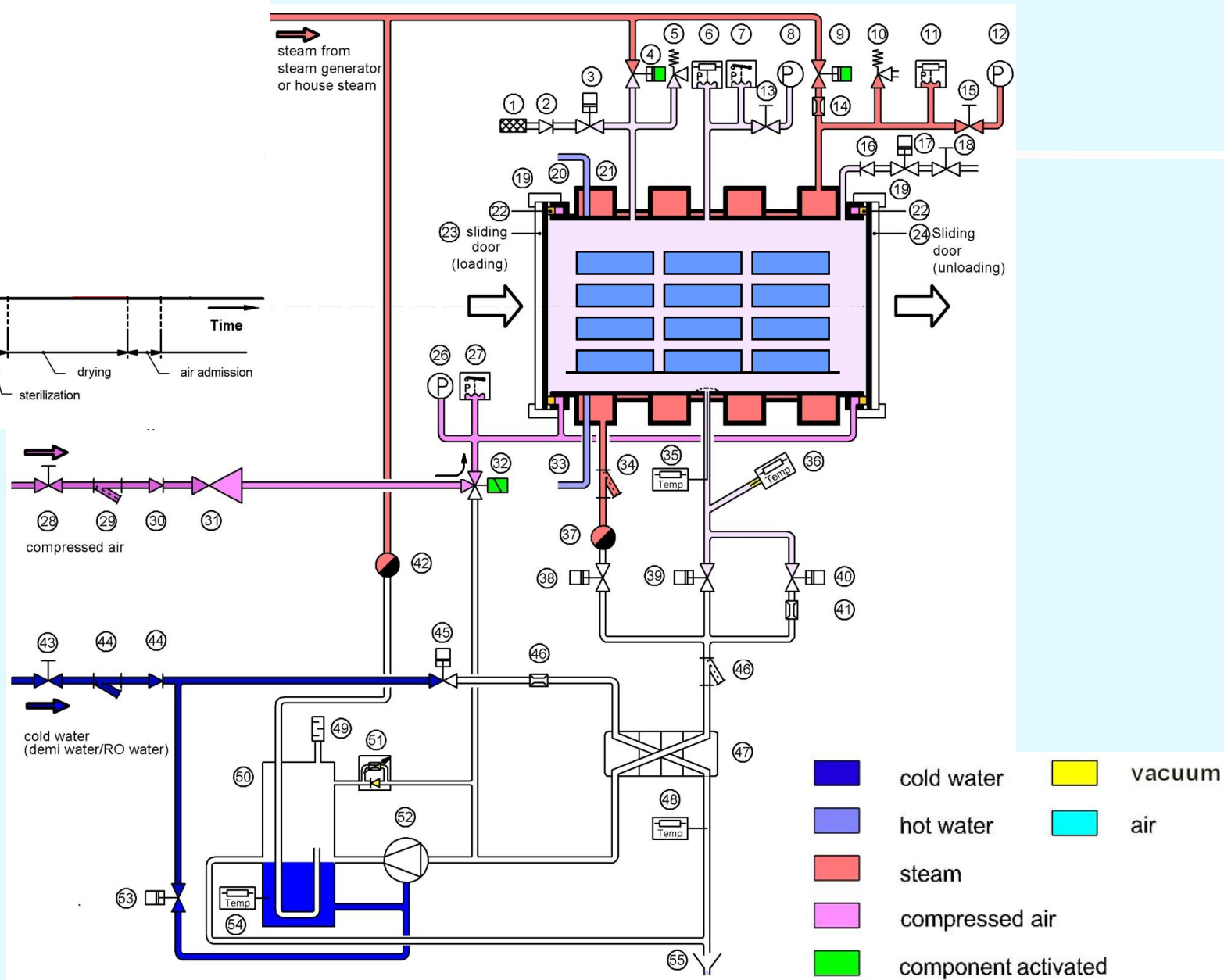
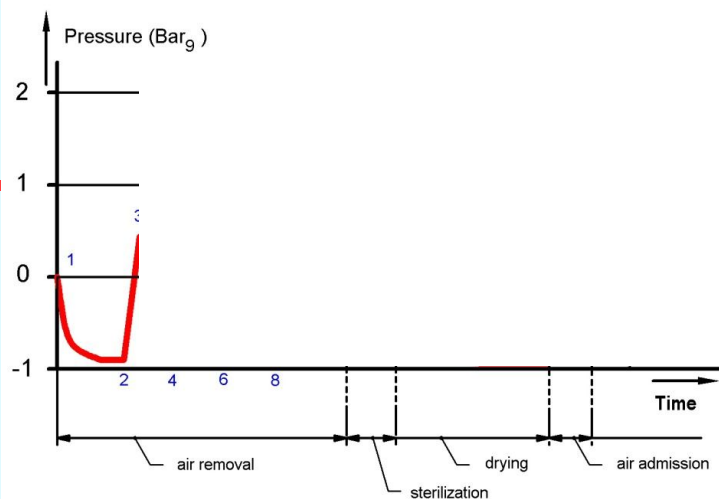




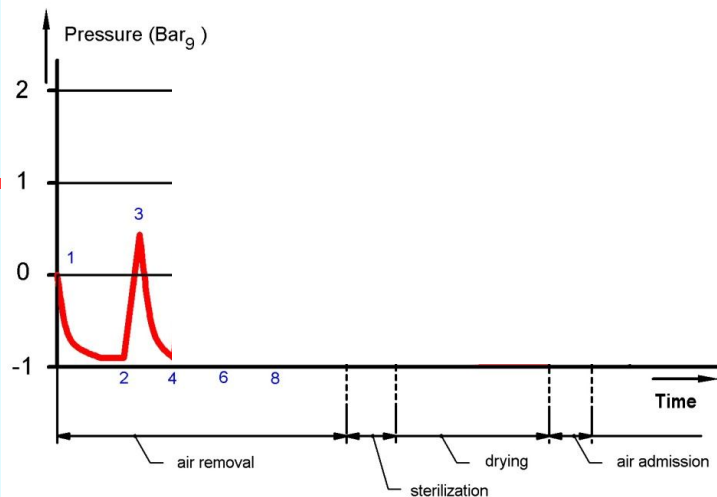
## Air removal

- Prevacuum 1



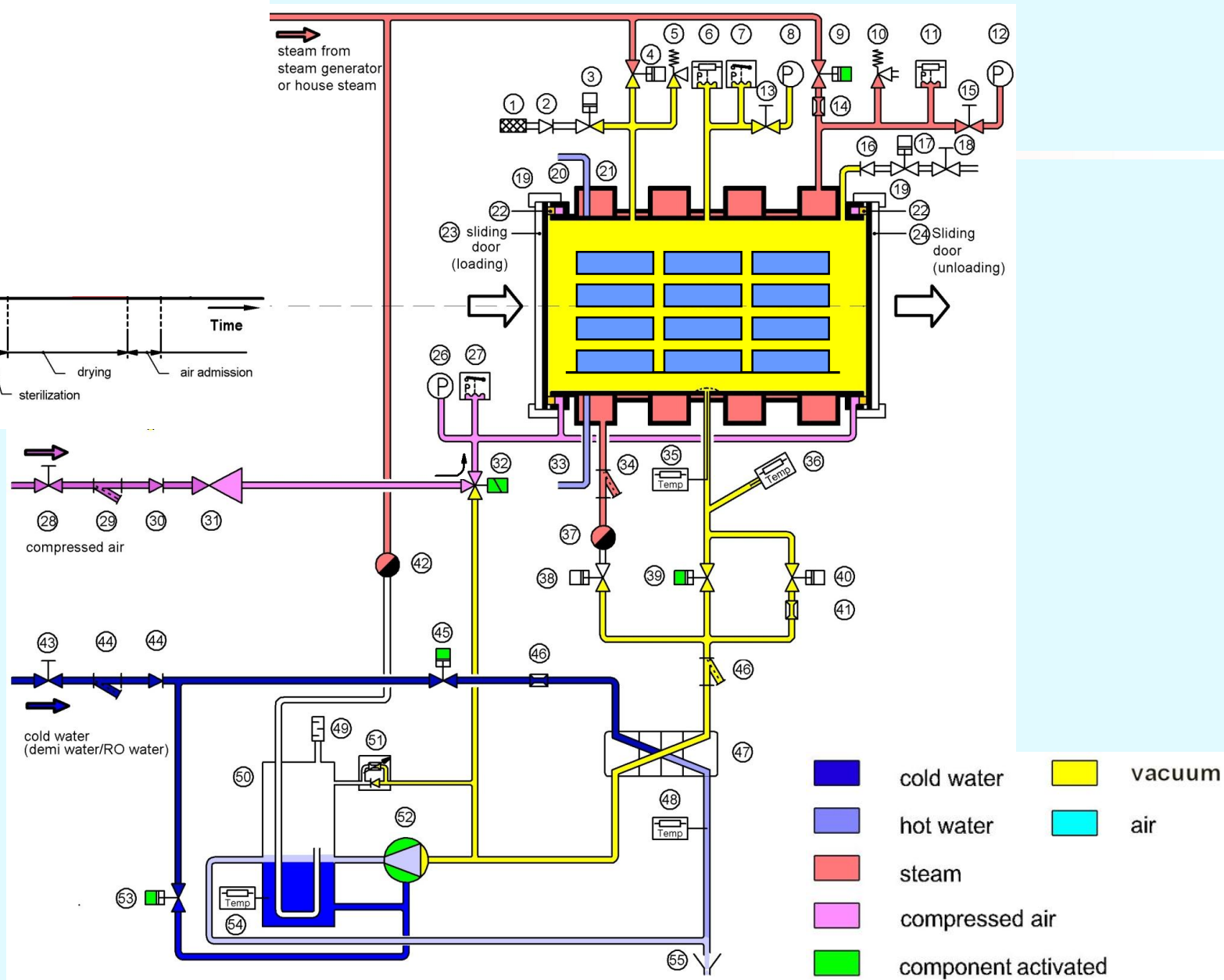


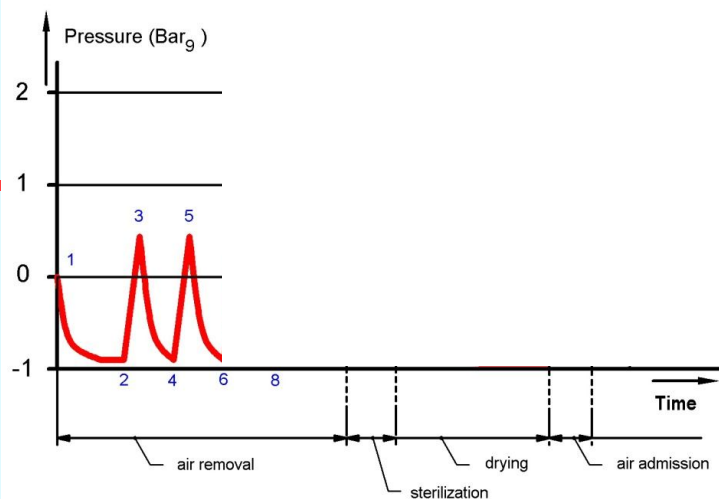
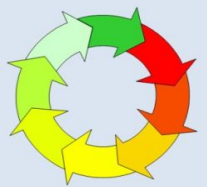




## Air removal

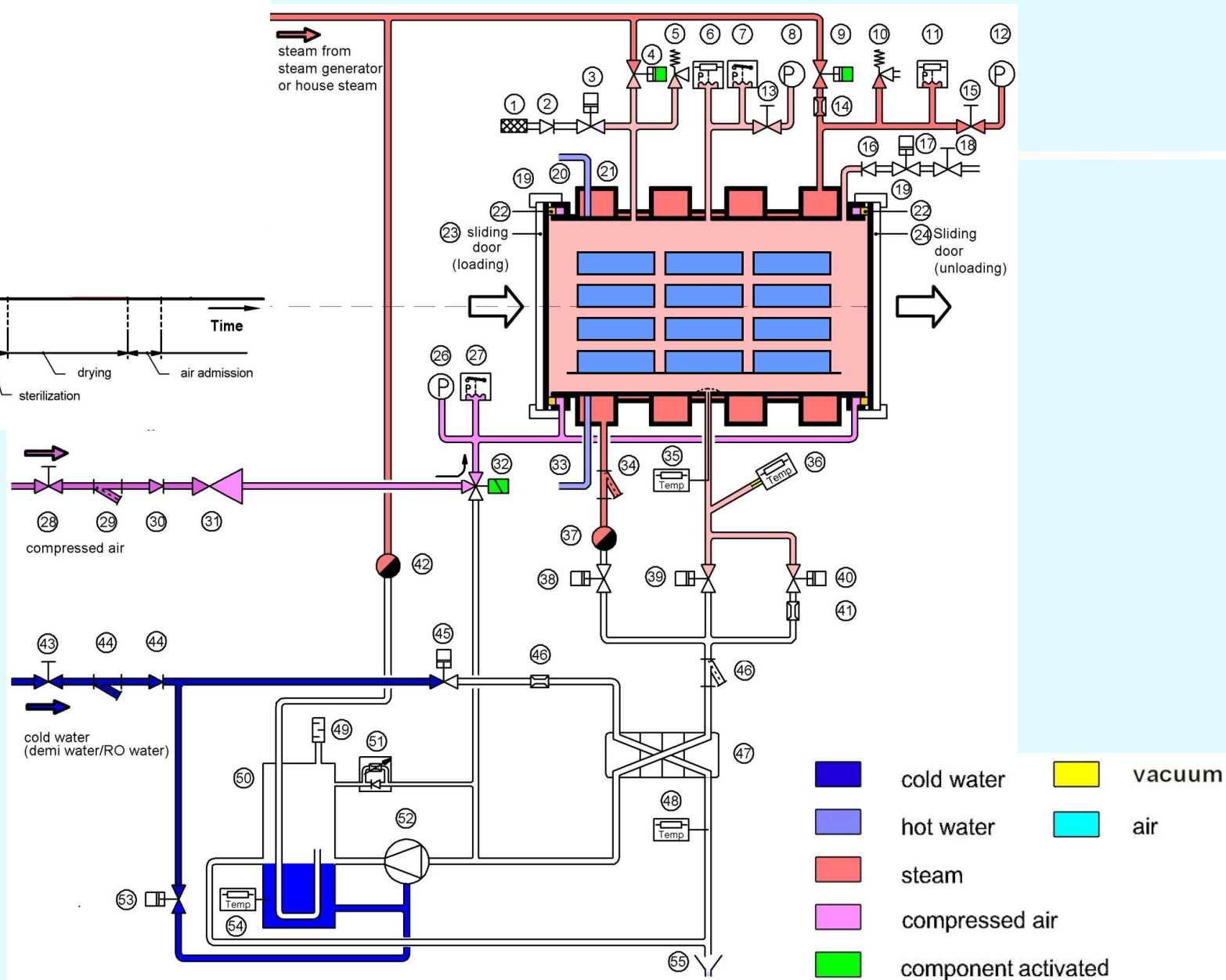
- Prevacuum 2





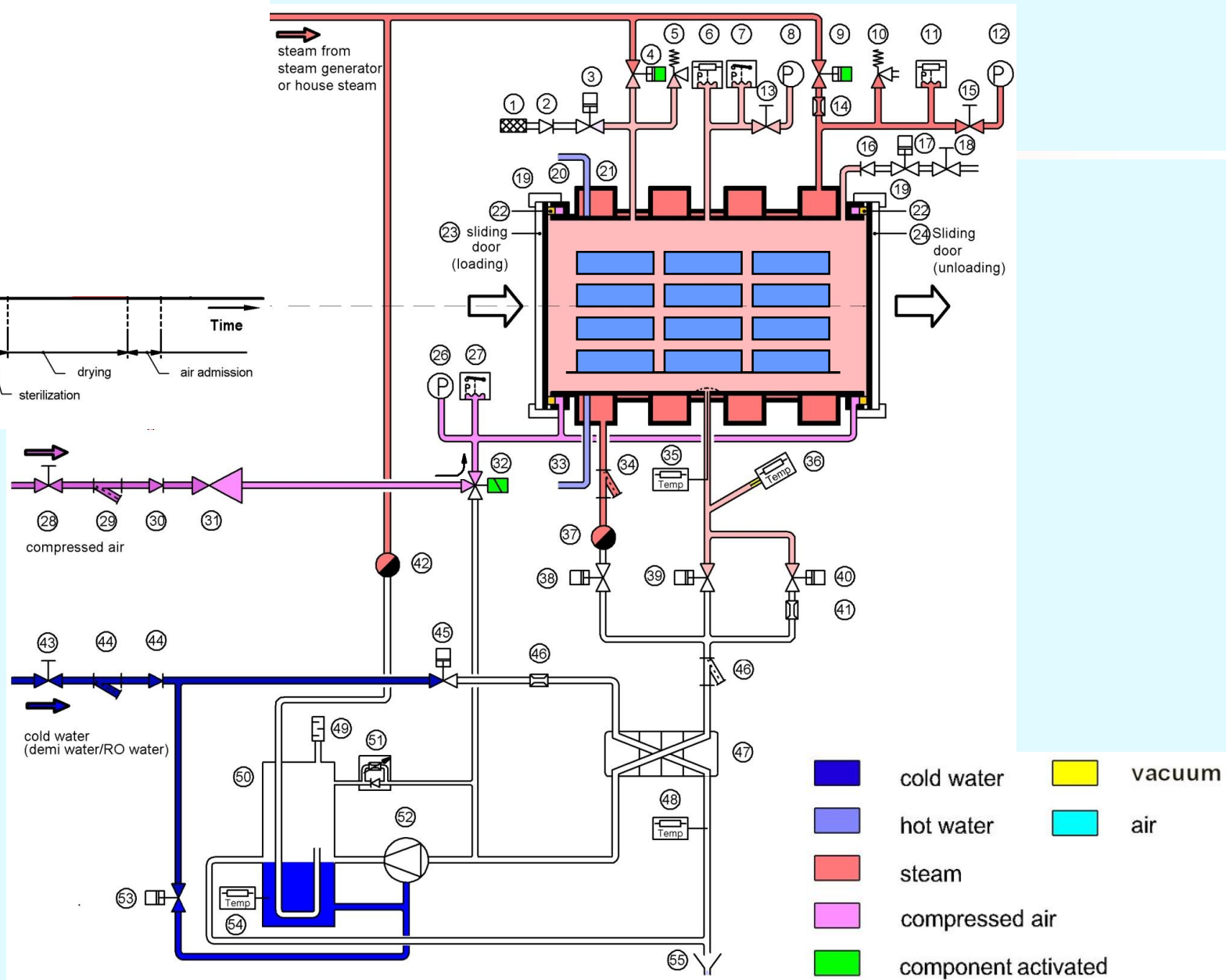
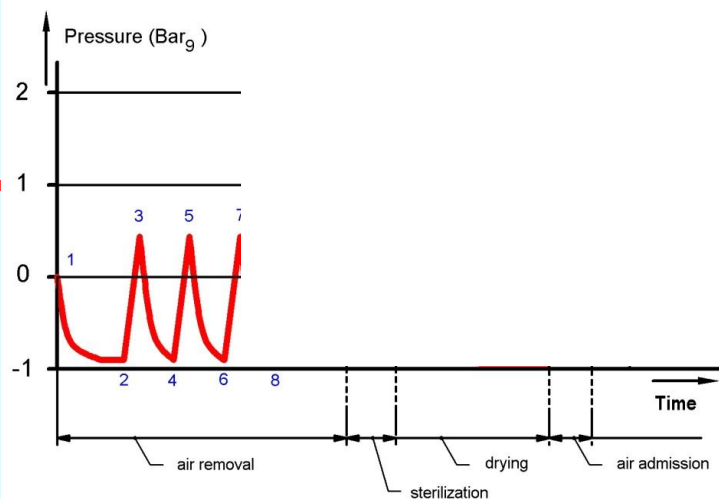
## Air removal

- Steam pulse 2

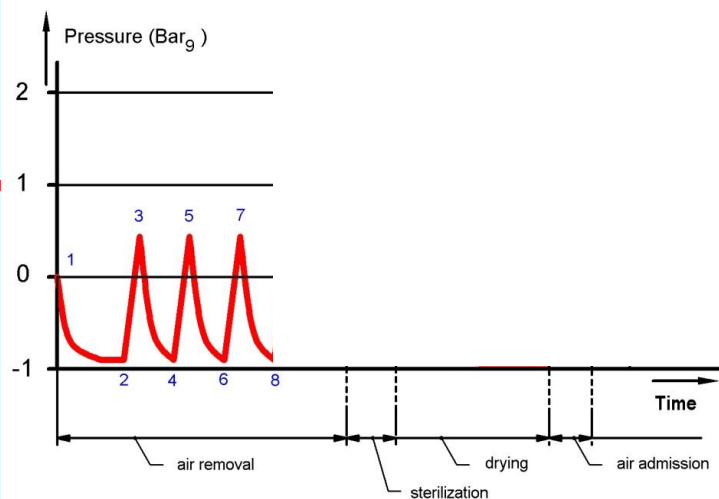
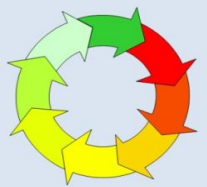






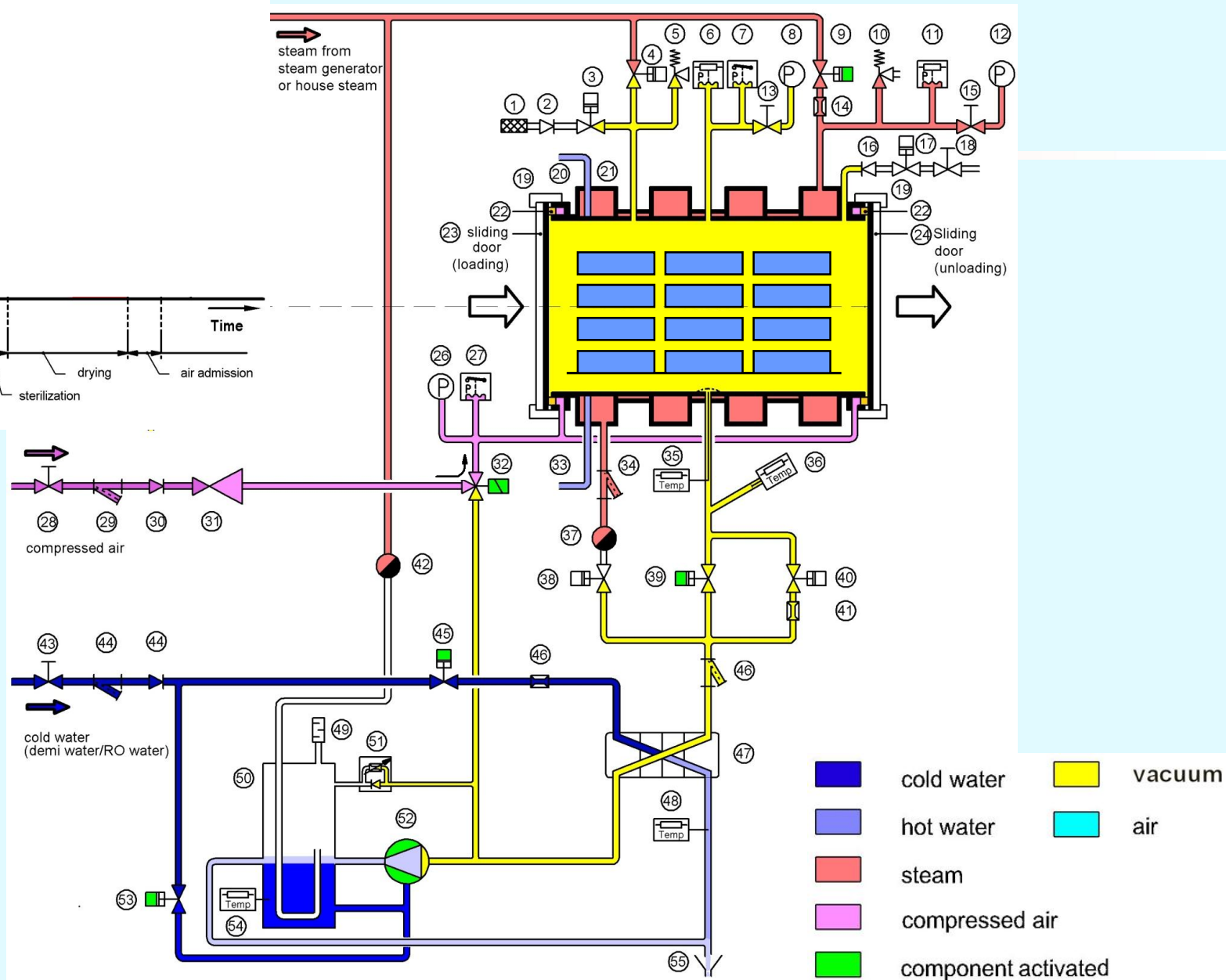


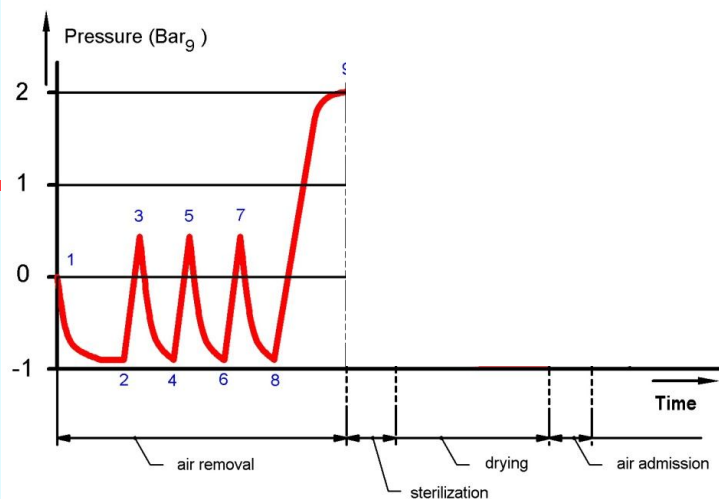




## Air removal

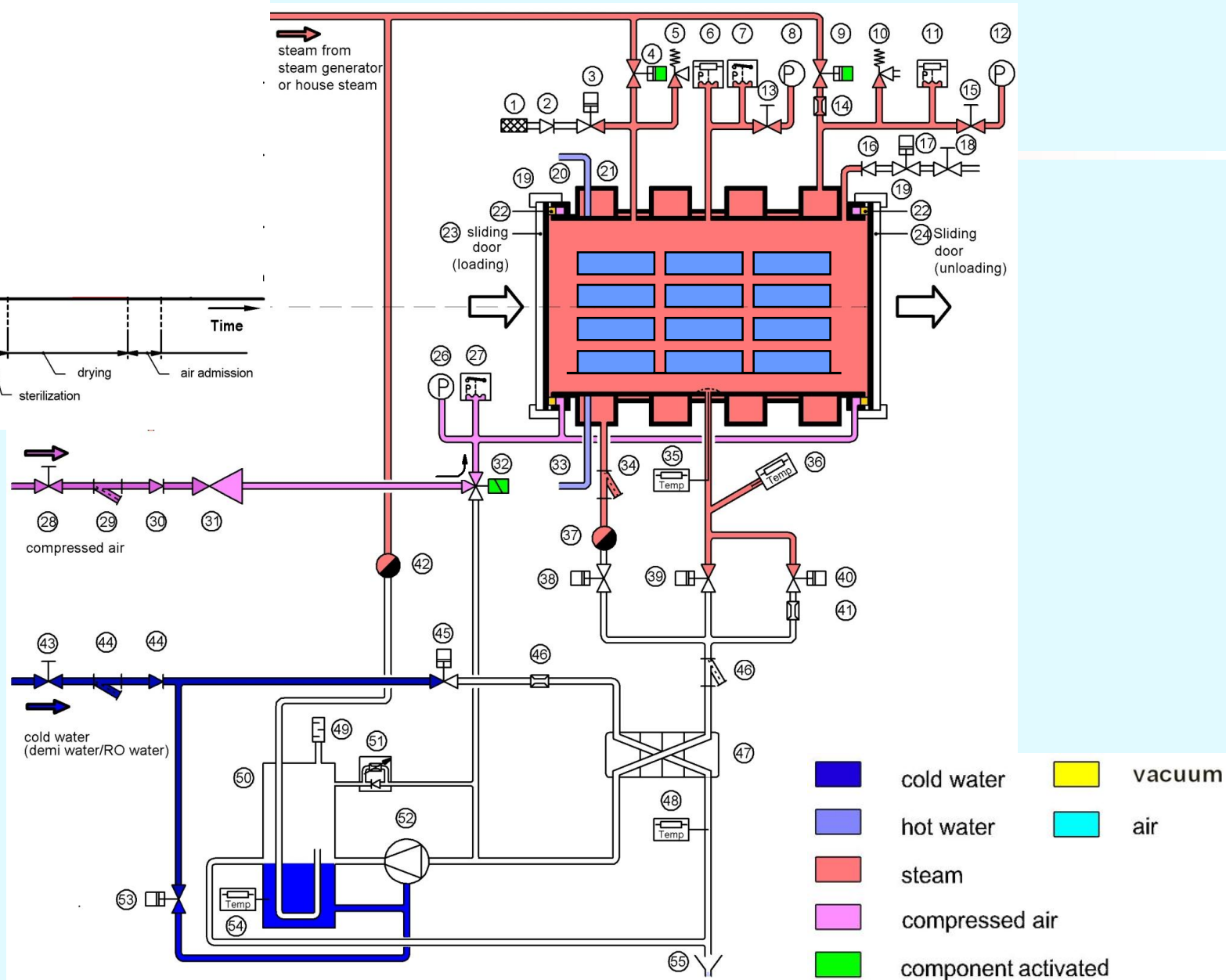
- Prevacuum 4



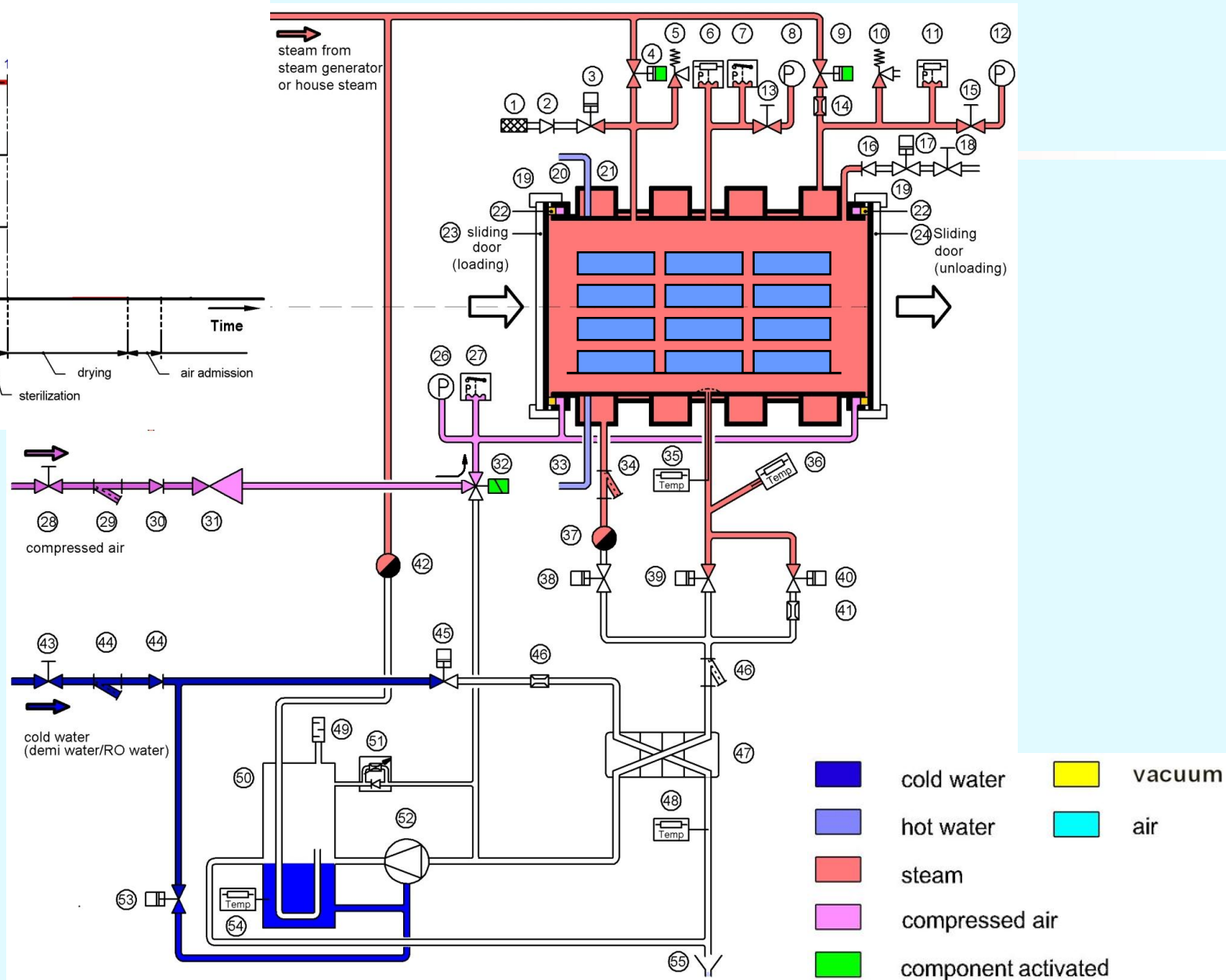
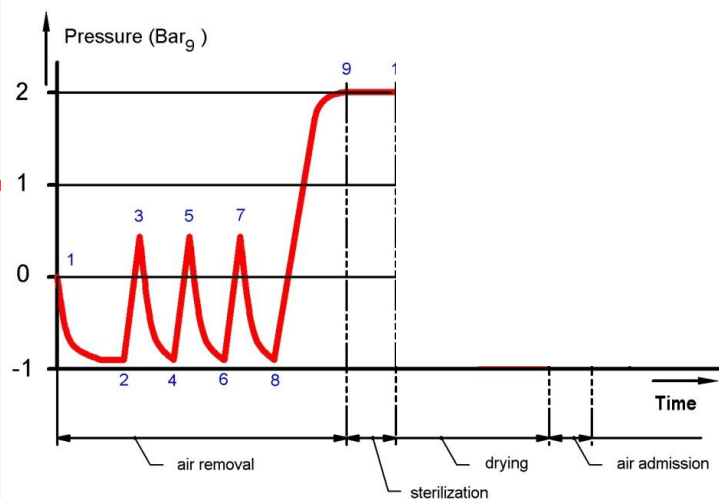


## Air removal

- Pressure rise to sterilization pressure/temperature

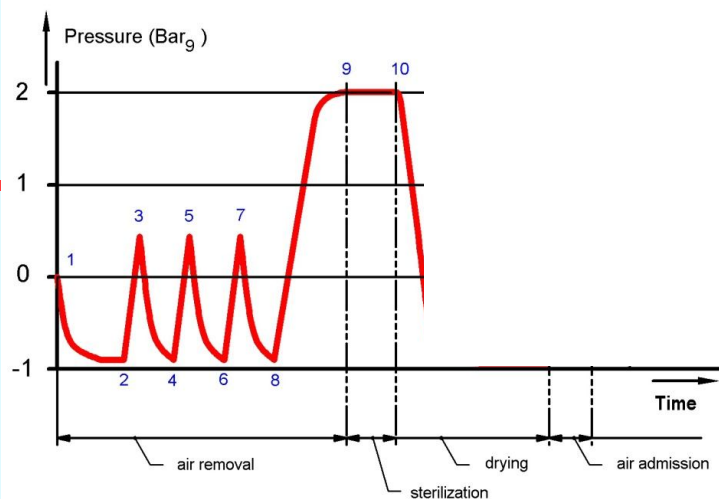
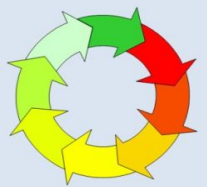






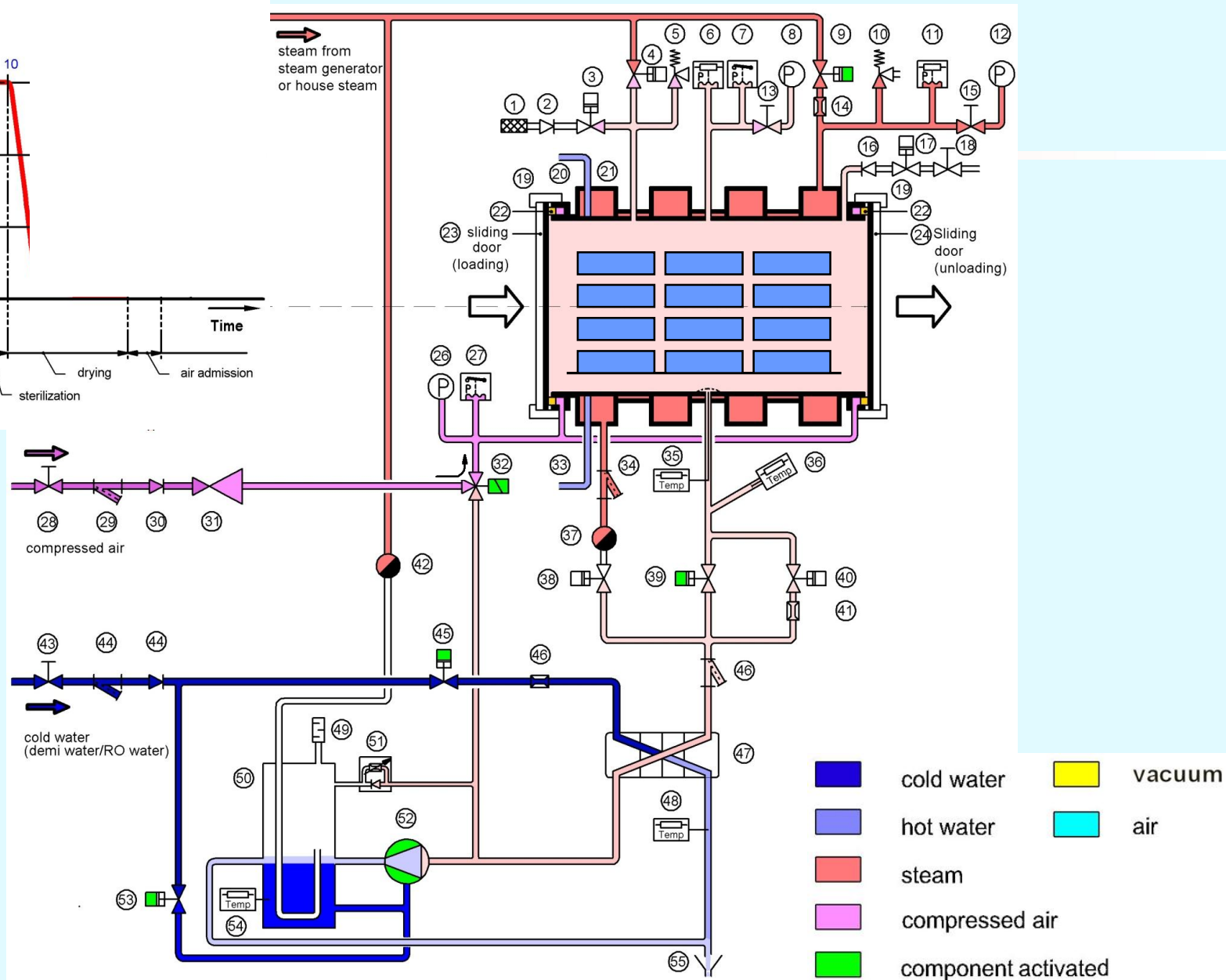
## Sterilization

- Required sterilization conditions:  
Time/Steam/  
Temperature

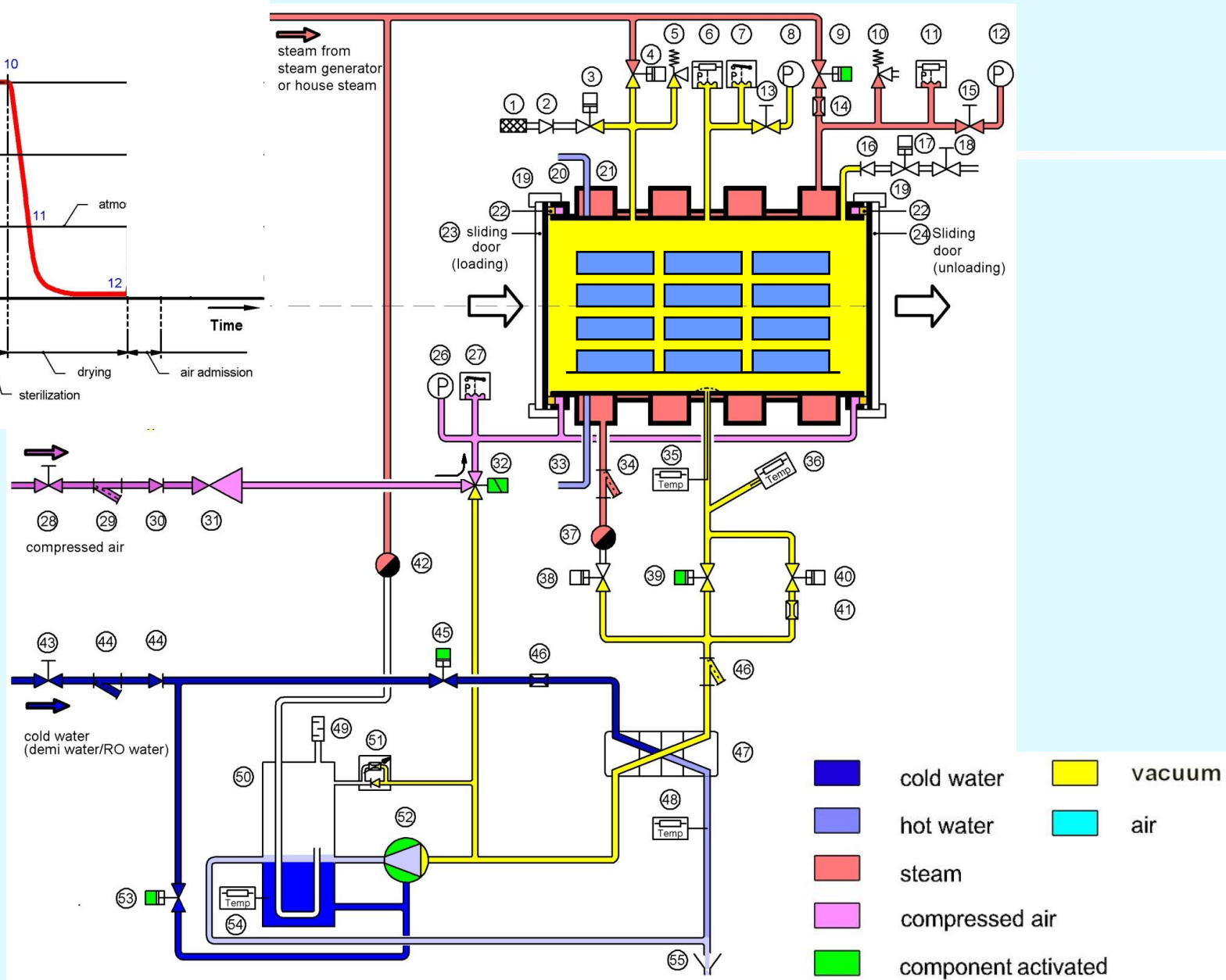
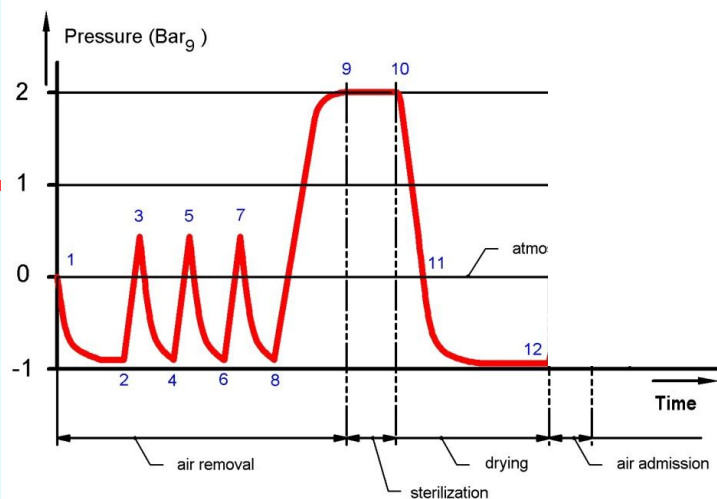


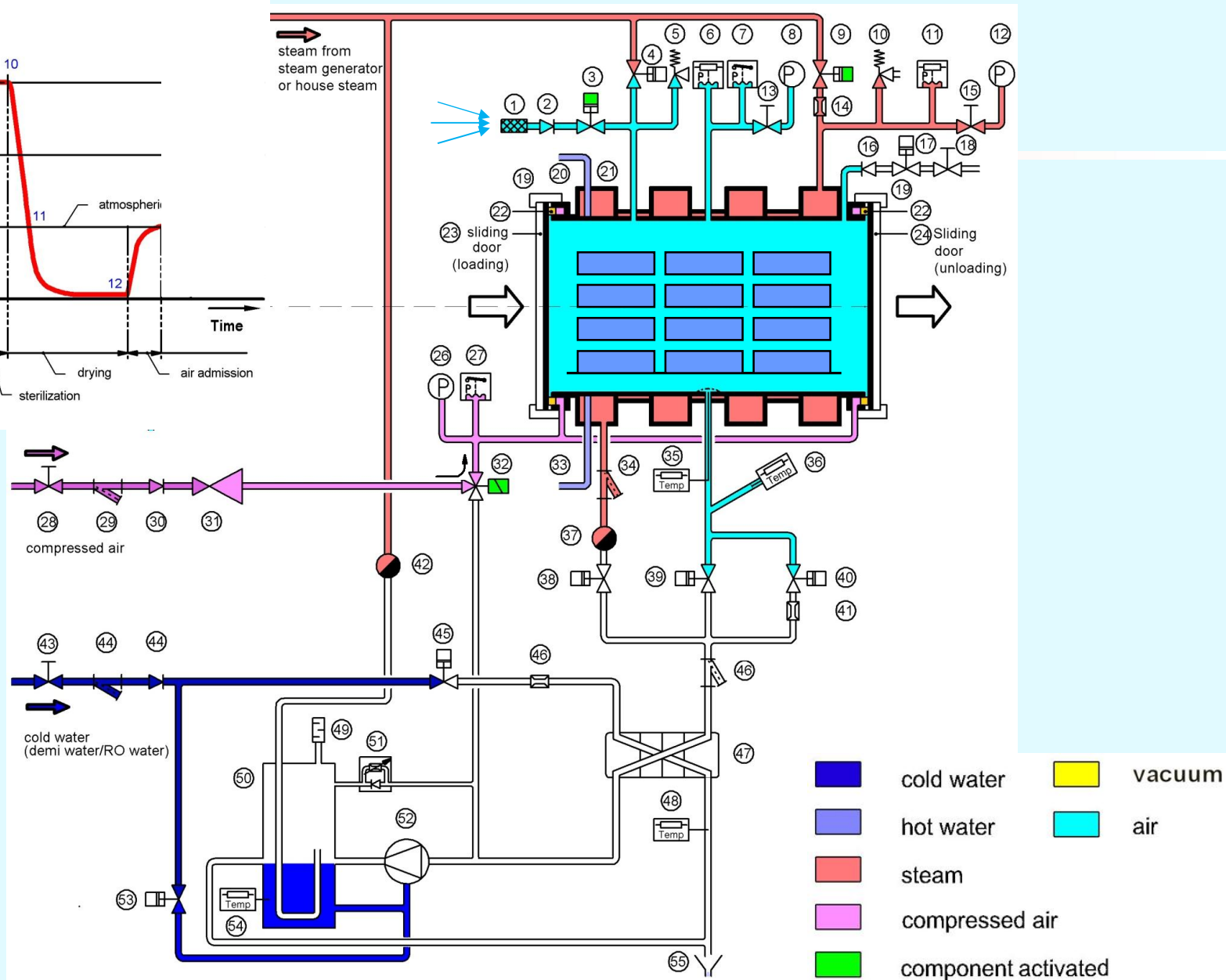
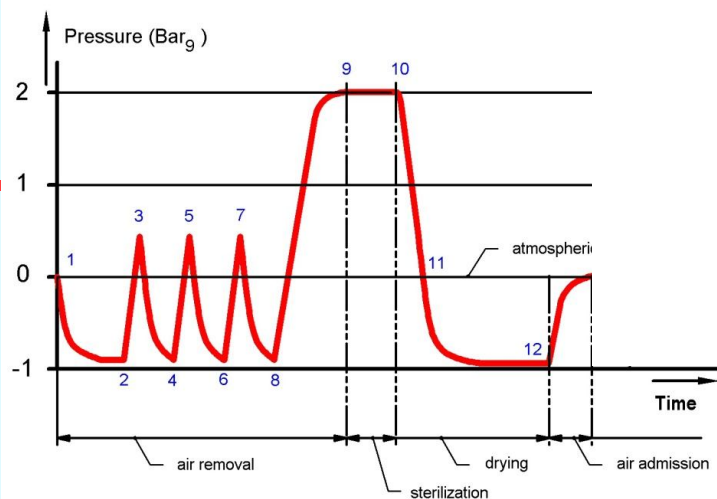
## Drying

- Steam release from chamber

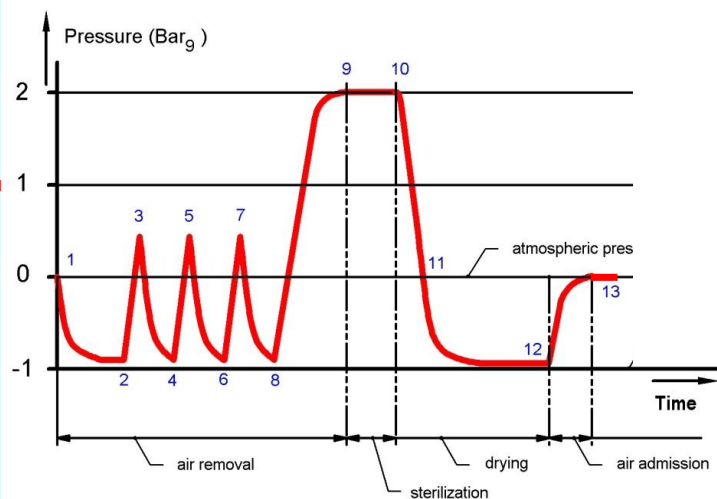






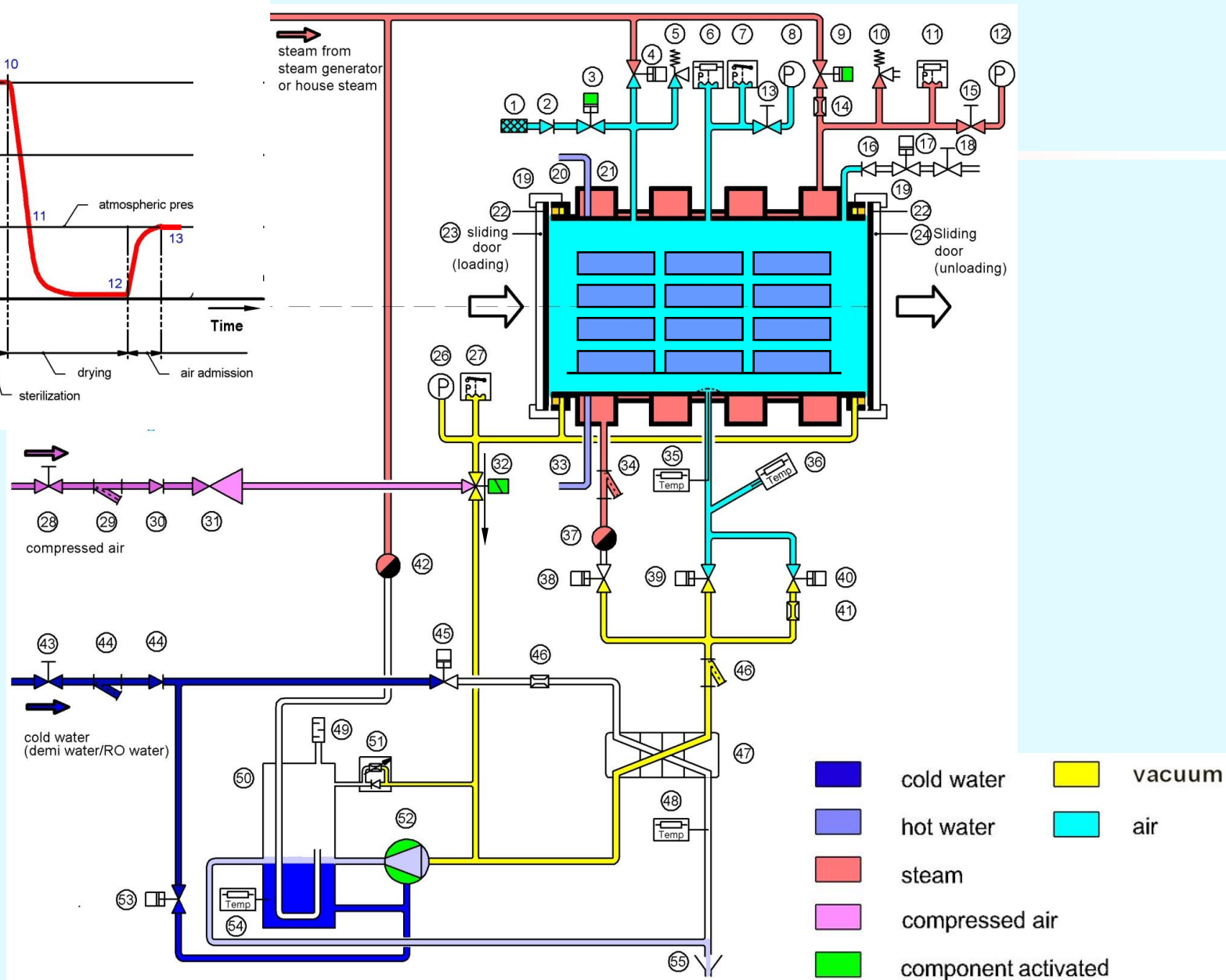


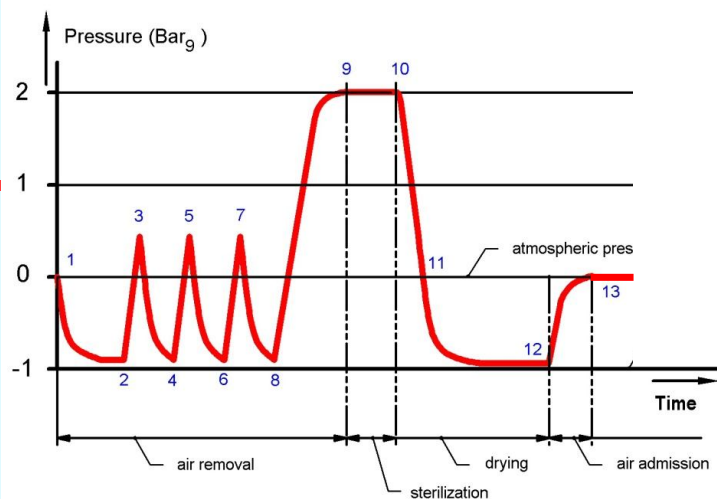
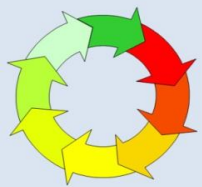




## Preparation opening door

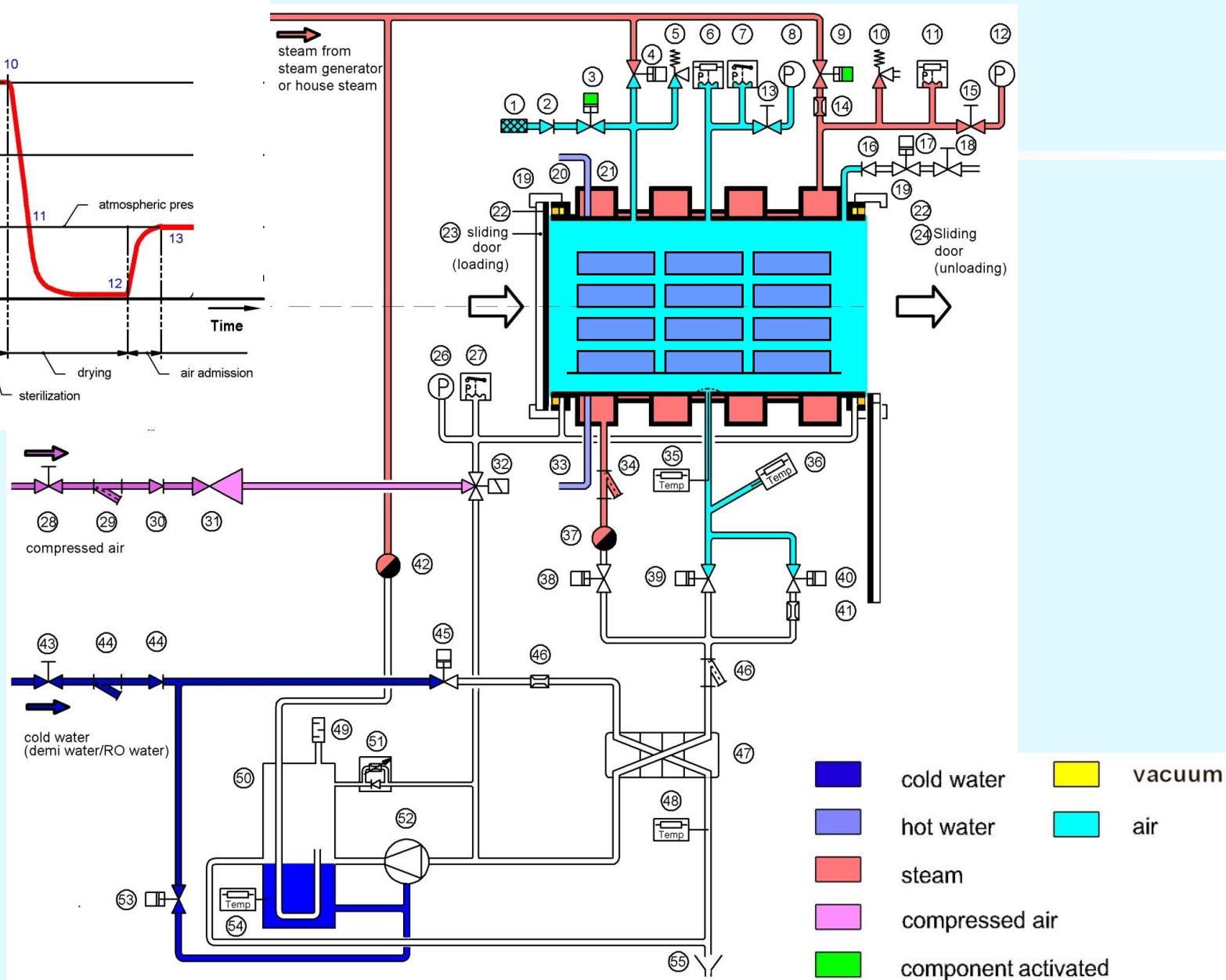
- Gaskets are withdrawn from door by vacuum



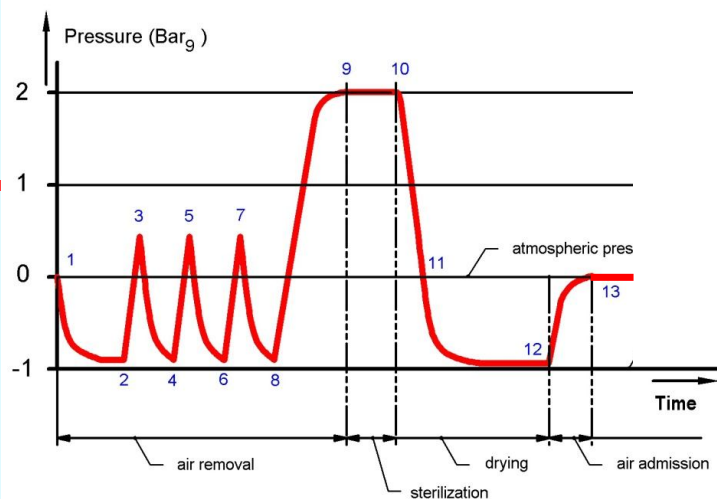
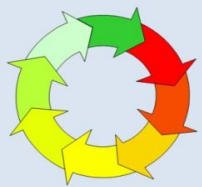


Cycle completed

- Doors are opened

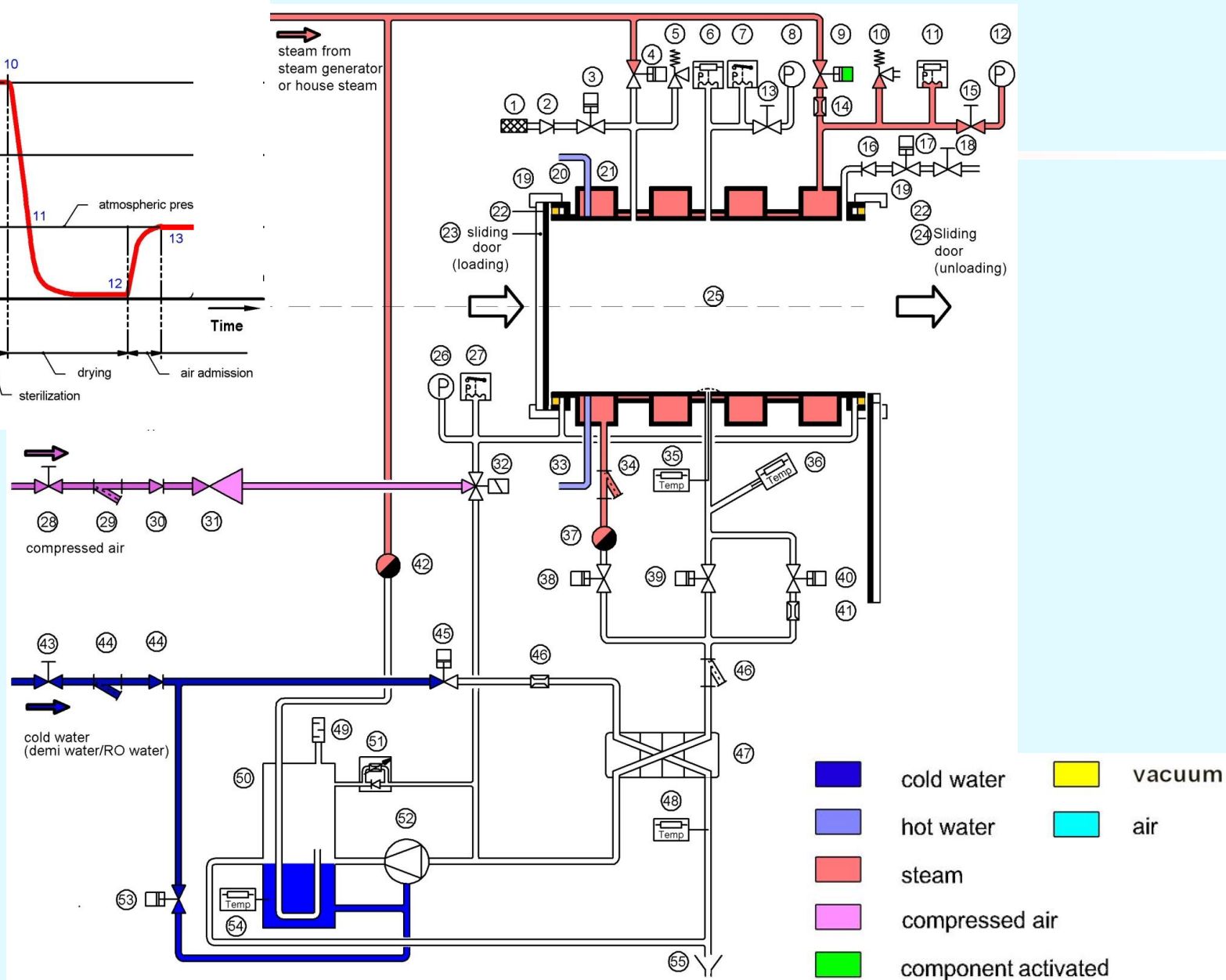


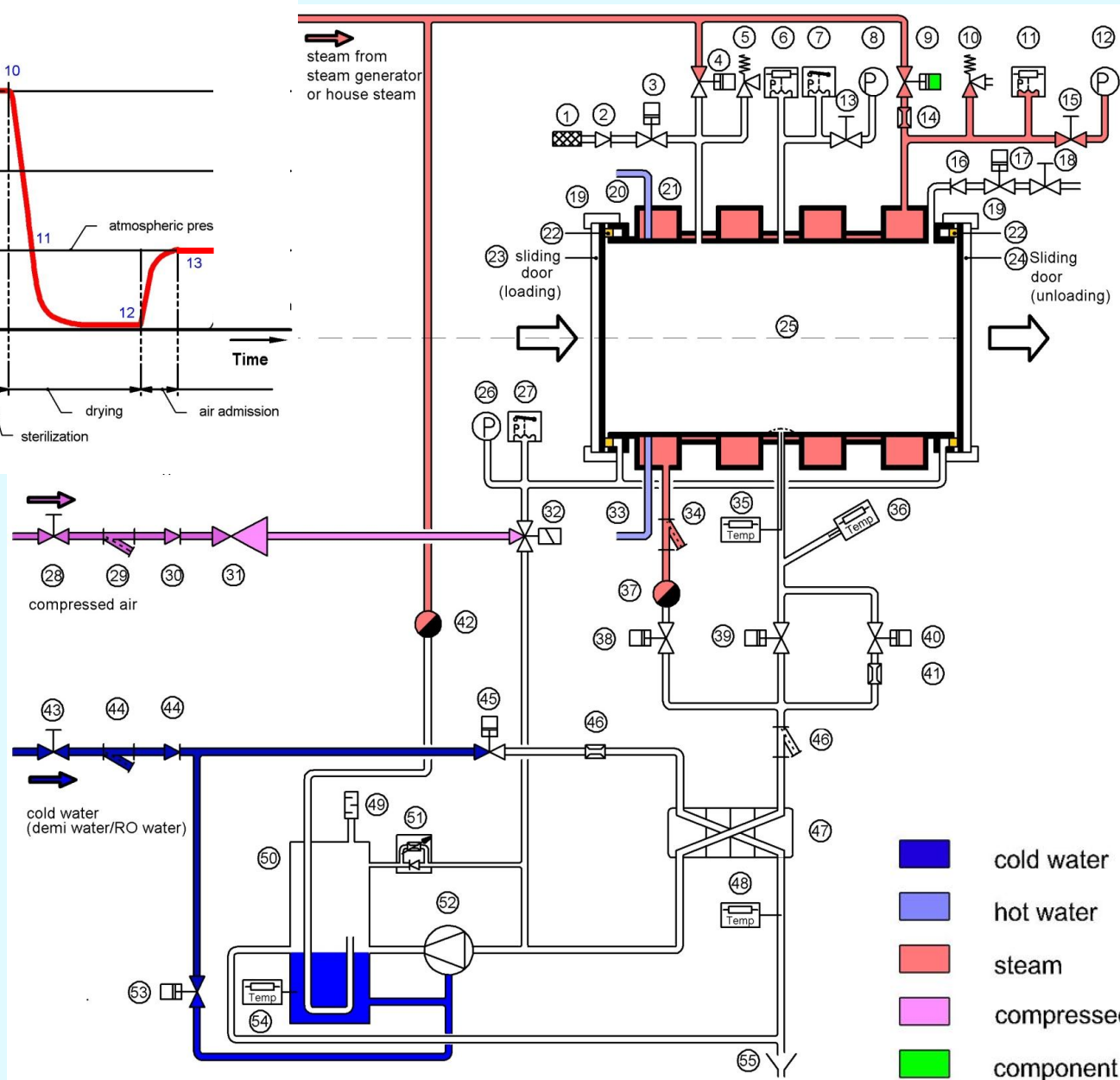
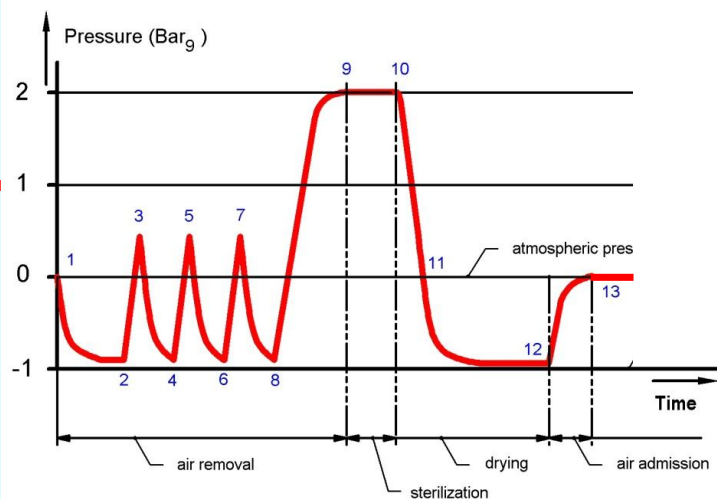




Cycle completed

- Load removed



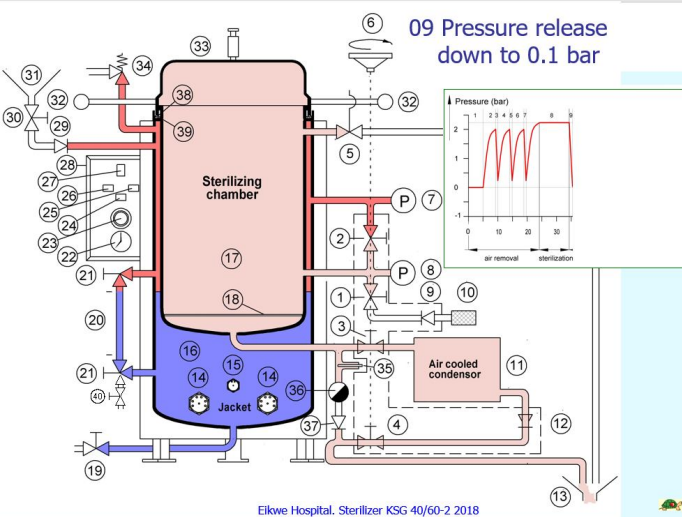


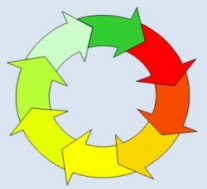
Cycle completed

- Unloading door closed.
- Ready for next cycle



# Making it visible: Process simulations for various sterilizers, depending on the site of the training



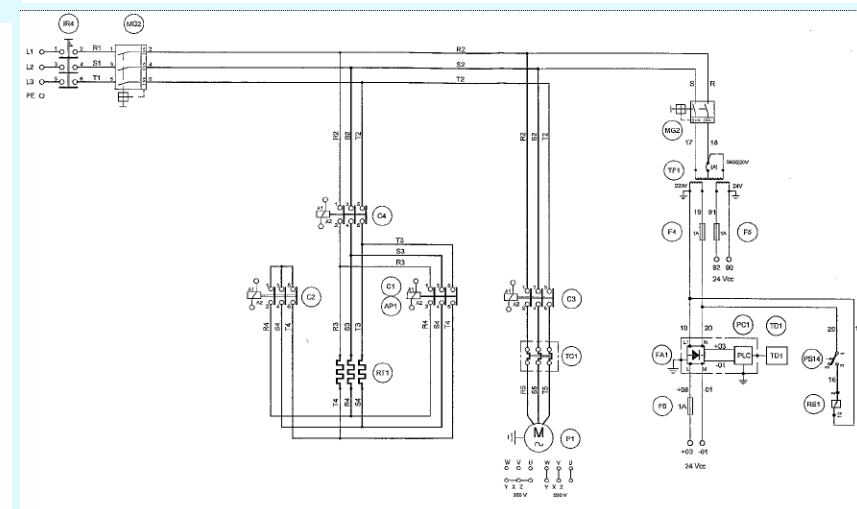
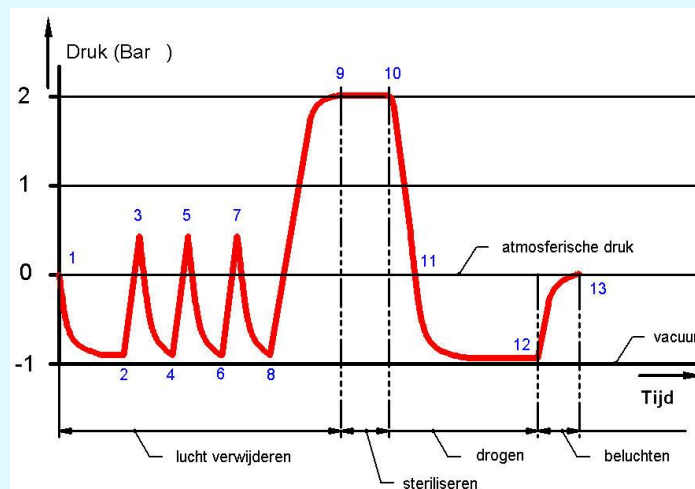
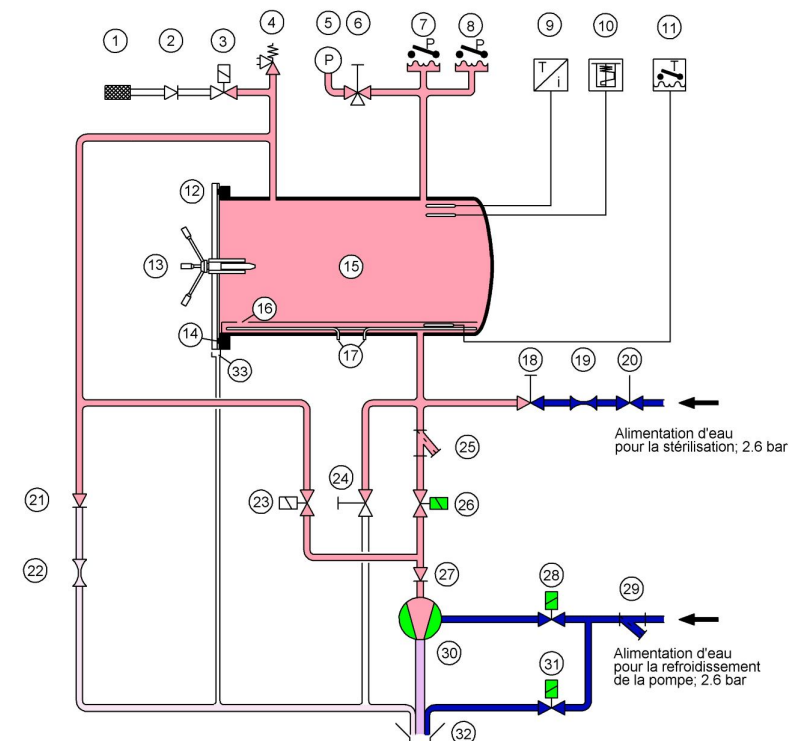


# Technicians training

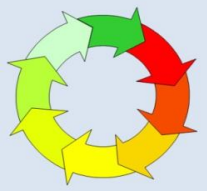
Also technicians must know general background on sterilization:  
Microbiology, infection control, sterile supply cycle

## Topic: Sterilizer technology

- Understanding the processes
- Piping diagram
- Electrical diagram



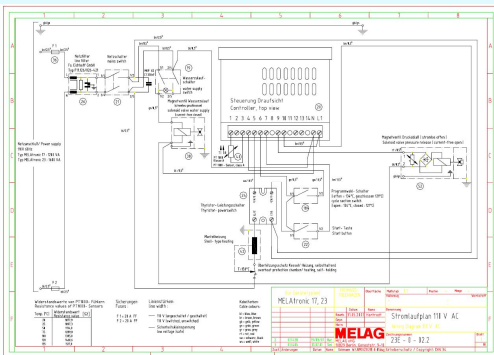
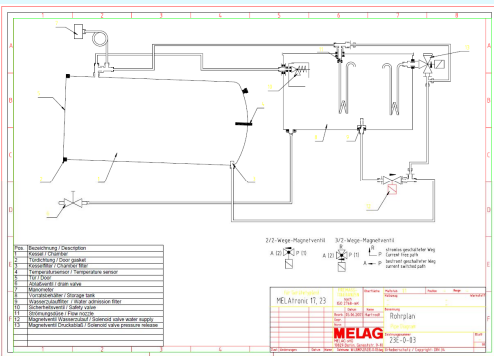




# Technicians training

## Topic: Fault finding

- Understanding the symptoms
- Consulting documentation
- Consulting manufacturer/supplier for support
- Assessment/identifying the problem
- Presenting the results to group



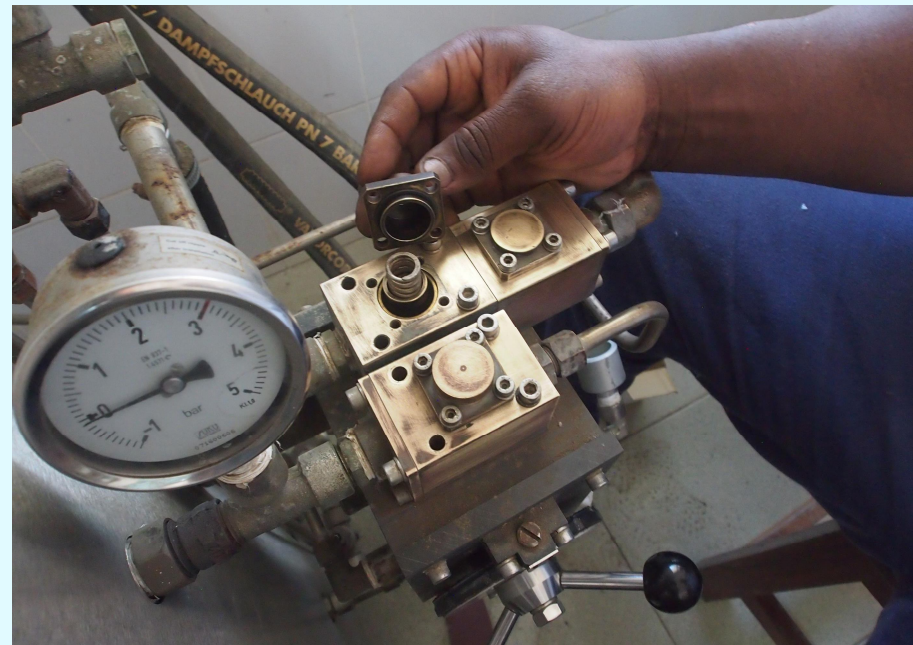




# Technicians training

## Topic: Planned preventive PPM

- Identifying components for PPM
- Performing PPM
- Spare parts for PPM
- Spare part management







# Technicians training

## Topic: Repairs

- Response on break down
- Know your limits
- Adequate tools
- Spare part acquisition/management







# Recognition

## Provide certificate as confirmation of knowledge/skills

- Pre-post test enables assessment of results; stimulates studying
- Certificate stimulates attitude toward training
- Stimulates personal career; CV
- Contributes to recognition of position of CSSD staff in the hospital
- Recognition by health authorities
- Certificate stimulates self confidence







- Computers/smart phones have become mainstream
- Acceptance of eBooks
- Increasing cost of postage
- Virtually no environmental footprint

- Computers/smart phones have become mainstream
- Acceptance of eBooks
- Increasing cost of postage
- Virtually no environmental footprint

Hint!





PDF eBook

Huys

**PDF eBook - Stérilisation des dispositifs...**

Auteur: Jan Huys Dans un hôpital ou une clinique, il est indispensable que tous les équipements et matériels utilisés

€

\*

Add to cart

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Compare

♥

Remember

En un hospital o centro sanitario, es importante que todos productos y material usados para el tratamiento de los pacientes sea absolutamente seguro en su uso ya que el riesgo de contagio de enfermedades desde el tratamiento es más bajo posible. La higiene ha demostrado su efectividad en muchos procedimientos para combatir este peligro. La demanda para asegurar procedimientos sanitarios para el control de infecciones se ha convertido en un tema importante, especialmente en el caso de enfermedades como el SIDA, de rápida diseminación a través de la sangre, enfermedades como la hepatitis B, que pueden ser transmitidas por instrumentos quirúrgicos contaminados, los accidentes y el contacto de heridas y quemaduras más sencillos para los procedimientos de descontaminación y esterilización.

Este libro se concentra sobre todo en el método de esterilización más común y seguro de los utilizados actualmente en los hospitales y centros sanitarios, la esterilización mediante vapor a presión. Los primer paso importante para la mejora del trabajo actividad es la formación del personal implicado en la misma. En los últimos años se ha desarrollado particularmente el método de limpieza y esterilización de los instrumentos quirúrgicos que exigen la formación adecuada para todos aquellos personal, enfermeras, técnicos, voluntarios y/o de mantenimiento, que están implicados en la esterilización. Con el objetivo de contribuir con esta labor se ha creado este libro, que esperamos se convierta en un manual para cualquier persona interesada en el campo de esterilización. Este 3.º volumen contiene un listado completo sobre Sistemas de Vapor Autoclave. El contenido sobre legislación y normas se ha actualizado a las últimas acontecimientos, y cuando lo sea necesario, se han revisado el libro y las ilustraciones de otros capítulos, incluyendo, además, la formación de tiempos de pasteurización en vías de desarrollo, se ha ido actualizando hasta convertirse en un libro de trabajo que puede ser utilizado por todos aquellos interesados en la formación en el campo de la esterilización de productos sanitarios.

Traducción en español realizada por María Gamiel y Diana Lorenza Marfil

mhp.medien

http://www.mhp-medien.de  
www.mhp-medien.de/es

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ISO 9001  
ISO 14001  
ISO 13485  
ISO 13485

ISO 9001 14001 13485  
ISO 13485 13485 13485

Limpieza, Desinfección, Esterilización y Productos Sanitarios

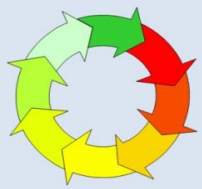
Jan Hays

Limpieza,  
Desinfección y  
Esterilización de  
Productos  
Sanitarios

Tercera edición en español

Jan Hays

Traducción en español realizada por María Gamiel y Diana Lorenza Marfil

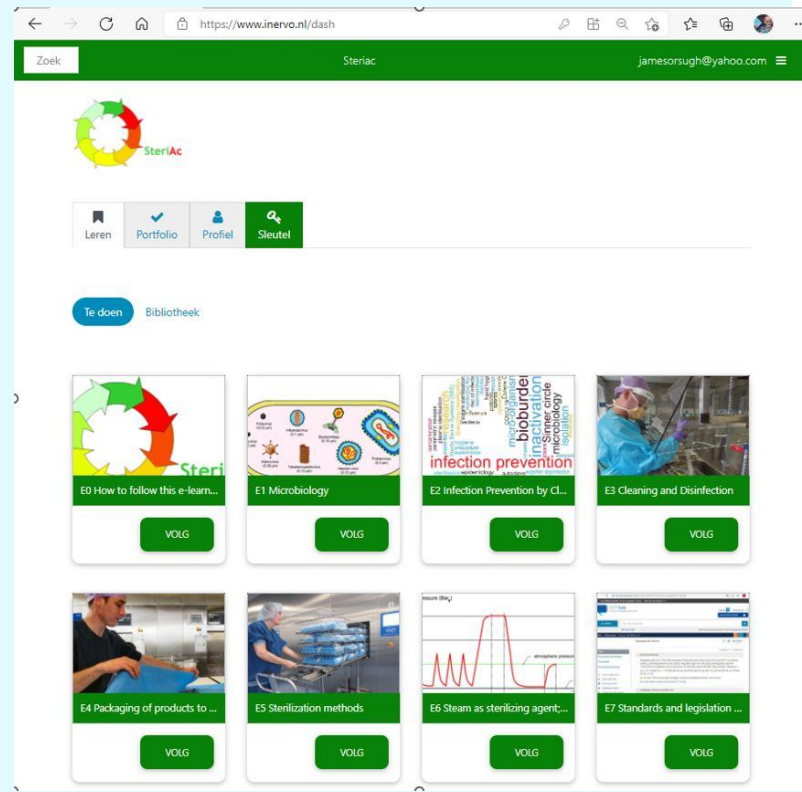
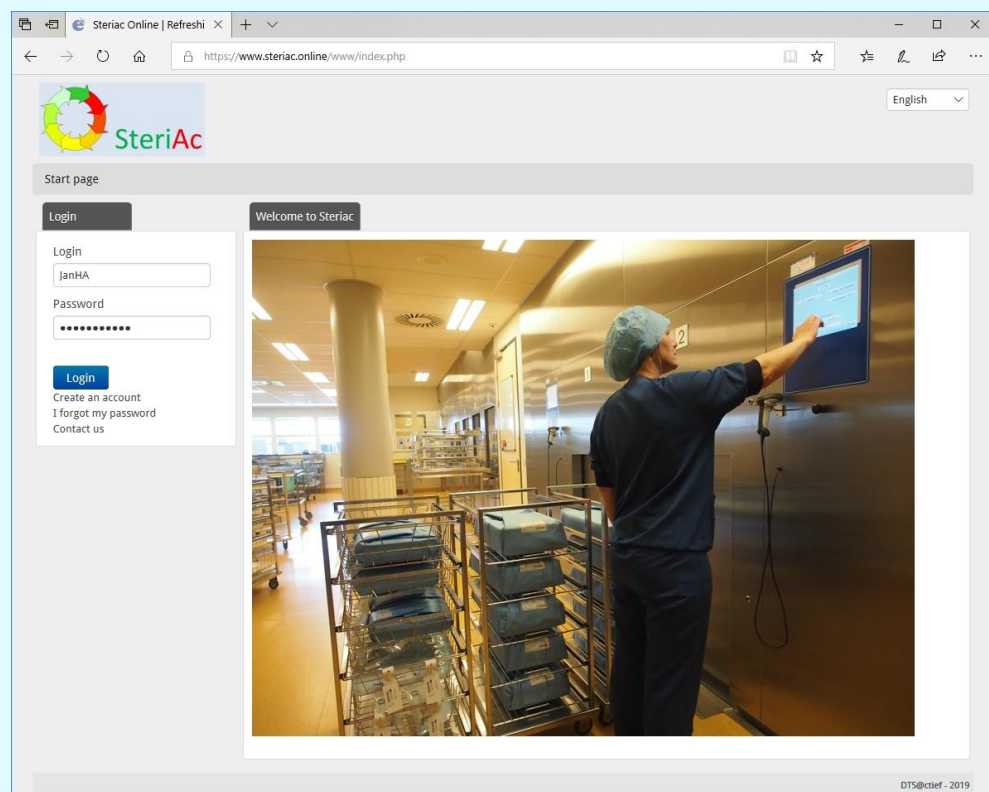


# New media: e-learning

Since 2016: updating knowledge through eLearning/blended learning

- From any place any time
- E-learning platform; with accounts; evaluation, tests; self assessment

- Combination with contact-evening
- Approved by SVN; will be SVN based...!
- Available in Dutch and English







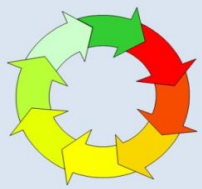
## On-going training: e-Learning/blended learning

### e-Learning combined with contact evening with participants

- After finalizing e-learning sessions: Evening at school or on site with presentations and demonstrations
  - Microbiology
  - Cleaning and disinfection
  - Sterilization





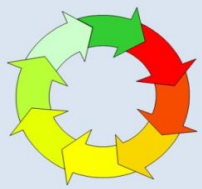


# Results/reactions

- Participants always eager to learn and enthusiastic!
- Reactions of sincere gratitude.
- "First time that I experienced such training in my long career in CSSD"
- "We need more and regular training!"
- "I get to know my sterilizer"
- "Understand my job better"
- "Understand better the importance of my work..." ; "I can contribute to better patient safety"
- "The training brought more than just knowledge; it brought me confidence in my work!"
- Swedish reaction on the book : "the book is like our bible!" 😊



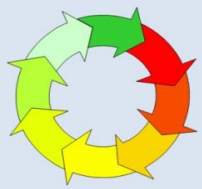




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- Reactions of sincere gratitude.
- "First time that I experienced such training in my long career in CSSD"
- "We need more and regular training!"
- "I get to know my sterilizer"
- "Understand my job better"
- "Understand better the importance of my work..." ; "I can contribute to better patient safety"
- "The training brought more than just knowledge; it brought me confidence in my work!"
- Swedish on reaction the book : "the book is like our bible!" 😊
- **Enormous gap in resources** between locations. **Education is crucial.** A huge job at hand! Need for follow up!





**A tribute** to all those participants; and to all CSSD staff and technicians in all health facilities!  
A sincere thanks for their dedication, enthusiasm, their happiness, the great times we could share!  
Verse1: Feeling from the experience of the teacher; verse 2 from experience of the participant.

So much to teach on  
sterile supply,  
I can't make it any-  
more!  
Seeing the smile on  
the students' face,  
feels like knockin'  
on heaven's door!

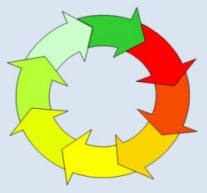
**CHORUS:**

Knock, knock,  
knockin' on heaven's  
door!  
Knock, knock,  
knockin' on heaven's  
door!  
Knock, knock,  
knockin' on heaven's  
door!  
Knock, knock,  
knockin' on heaven's  
door!

So much to learn on  
sterile supply,  
I can't grasp it any-  
more!  
But when  
understanding comes  
to me,  
feels like knockin'  
on heaven's door!







# Materials on the table

- Sheet non-woven: cover for table
- Microbiology
  - Petri dishes with culture medium
- Infection prevention (importance of hand hygiene)
  - UV Light/batteries
  - Glow germ powder
- Cleaning
  - UV Light, Glow germ powder
  - Instruments, glass of water, salt
  - Syringe with water; syringe with fluid soap; sheet non-woven
  - Glass with salty water; surgical instruments also with hinges;
  - microscope, instrument set
- Physics of steam
  - Steam demonstration kit (Erlenmeyer flask, stopper with T-sensor, pressure gauge, vacuum pump, hoses, connectors, digital thermometer, Kidney dish, hot plate)
- Operation of steam sterilizer: Real time
  - Steam demonstration kit
  - Thermocouple passage for 2 thermocouples; with pressure gauge, air inlet valve
  - Digital thermometer
  - Timer/watch; paper; clipboard, pen
  - Bowie and Dick textile pack; with A4 test sheet
  - Autoclave tape
- Operation of steam sterilizer after cycle
  - As with real time
  - Datalogger for Pressure and 2x temperature
  - Interface for datalogger
  - Software for downloading data, presenting and assessment of measuring results
- Guitar
  - Guitar, Guitar stand, tuner, plectrum, spare battery, guitar cable
  - Text song
  - Plectrum
  - Music stand

