SIP

Steam In Place

Objectives

Upon completion of this session you will be able to:

- Differentiate between **sterilization** and **sanitization**
- List what **equipment** is sterilized
- Identify key points of **steam in place**
- Describe the principles of **T.P.T**
- Differentiate **double valves** and **steam traps**
- Identify steam **safety** issues

What is SIP?

- **S**team **I**n **P**lace
- SIP uses steam to sanitize or sterilize equipment

Sterilize or Sanitize?

Sterilization - A process which leads to the **absence** of microbial life.

Sanitization - A process which lends to the **reduction** of life.

Sterilization vs. Sanitization

SIP

- Steam equipment that can not be autoclaved
- Maintain positive air pressure to ensure sterility

Autoclave

SIP

- Not kept under positive pressure

Chemical Sanitization

- NaOH Solution

What do we SIP?

- Tanks and fermenters
- Filter housings
- Transfer lines
- Water drops

Steam Types

- ***Plant Steam***: Steam derived from city water
- ***Clean Steam/Pure Steam***: Steam derived from Deionized Water (DIW)

SIP Requirements

T.P.T.

Temperature: 121° Celsius

Pressure: 15 psig (20 psig for final purification)

Time: 21 minutes

Saturated Steam Table

Pressure (psig)	Temperature°C
15	121
21	126
31	135
46	145

Sterilization Characteristics

η SIP

- Steam sent through equipment
- Requires pressure controls
- Can be done separately from other sterilization processes
- Short "heat-up" cycle
- Filters can be steamed with the tank

Autoclaves

- ∞ Steam surrounding an item
- ∞ Longer "heat-up" cycle
- ∞ Multiple cycles to achieve parameters
- ∞ Isolate by closing valves and tightening clamps

SIP Terms

- Condensate: liquid that forms when moist air contacts a cooler surface
- Tempilstik: a tool used to verify temperature on critical places on the equipment
- Resistance Temperature Device (RTD): measures and charts a vessel's temperature
- Purge: process of removing air or condensate from the system being steamed

Double Valves and Steam Traps

Double Valves

- Two valves inline
- Primary valve is open during SIP
- Secondary valve partially opened to release condensate
- Close primary valve first at end of SIP

Double Valves

Steam Traps

- Steam Trap replaces the secondary valve.
- Releases condensate, while maintaining correct temperature and pressure
- Close primary valve first at end of SIP

Steam Traps

When performing an SIP procedure…

- ∞ Always follow Standard Operating Procedures
- ∞ Ensure steam source pressure is at least 15 PSIG
- ∞ Check valve sequences (primary/secondary)
- ∞ Slope pipes to drain condensate
- ∞ Purge out the air and condensate
- ∞ Ensure steam traps are working
- ∞ Check temperature reference points

When completing an SIP procedure:

- ∞ Close valves per SOP
- ∞ Verify positive pressure on the system
- ∞ Tighten connections after SIP
- ∞ Be aware of **HOT** surfaces
- ∞ Document SIP (Times, Operator/Verifier)

Steam Safety

- Always wear PPE
- Assume the system is pressurized and at temperature
- Always check the pressure gauge
- Always use the bleed valve
- Leave written and verbal warnings of SIP/IP

SIP Quiz

What is the difference between *Sanitization* and *Sterilization*?

What three requirements must be met to complete an SIP? (Hint T.P.T.)

List three safety precautions you need to take during an SIP?

SIP

Remember:

- T. P. T.
- Steam Safety
  - PPE
  - Check pressure gauge and use bleed valves
  - Leave a warning