Loading for Success

Best Practices for Sterilizers & Instrument Preparation

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UNMC Nebraska Medicine

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Meet our Subject Matter Experts

Lauren Musil BSN, RN

Lauren is an Infection Preventionist with a background as Registered Nurse. She has a wide variety of healthcare experience having worked in neurology, neurosurgery, ambulatory surgery, home health and with the Nebraska Biocontainment unit. As an IP, her primary focus has been in critical care, oncology, VAE prevention and as the IP to the Nebraska Biocontainment Unit. Her recent work has been spent in a grant funded role to develop innovative tools to aid IPs in rural and remote settings.

Alisha Sheffield MSN, RN CIC

Alisha is an Infection Preventionist and Registered Nurse with 21 years of experience in a variety of healthcare settings including ambulatory, acute care, and surgical areas. Over the past 13 years, she has worked as an Infection Preventionist in outpatient surgery as well as at a large academic medical center. Her recent work has focused on utilizing her IPC expertise to develop infection control tools and resources to assist Infection Preventionists in under-resourced settings.

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Disclosure Declaration

- We have no financial disclosures or conflicts related to this presentation.
- The views and opinions expressed during this webinar are those of the presenters and do not necessarily reflect those of the University of Nebraska Medical Center or The Nebraska Medical Center.

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IPC Program Objectives

Describe evidence-based instrument preparation practices that impact sterilization effectiveness and patient safety.

Describe proper sterilizer loading techniques based on sterilizer type and load configuration.

Apply monitoring and documentation practices to validate successful sterilization processes.

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IPC Program Objectives

Spaulding Classification			
Patient Contact	**Device classification**	**Minimum Inactivation Level**	**Examples**
Intact Skin	Non-Critical	Low/Intermediate level disinfectant	Glucometers Wheelchairs Blood Pressure Cuffs Environmental Surfaces ~Bedrails, Call light, door handles
Non-intact skin or mucous membranes	Semi-critical	High-level disinfection	Endoscopes, speculums, laryngoscopes, respiratory therapy equipment, anesthesia equipment, etc.
Sterile areas of the body, including bloodstream	Critical	Sterilization	Surgical instruments, IV cannulas

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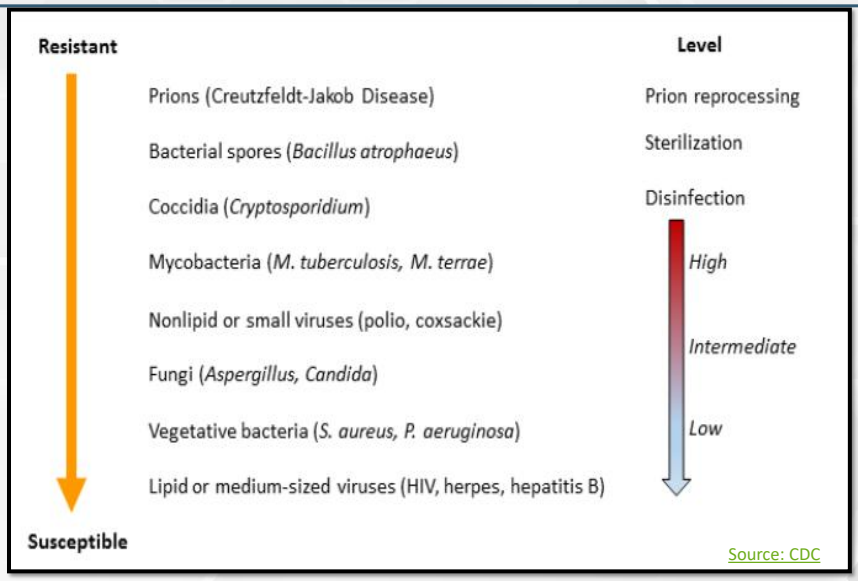
Background



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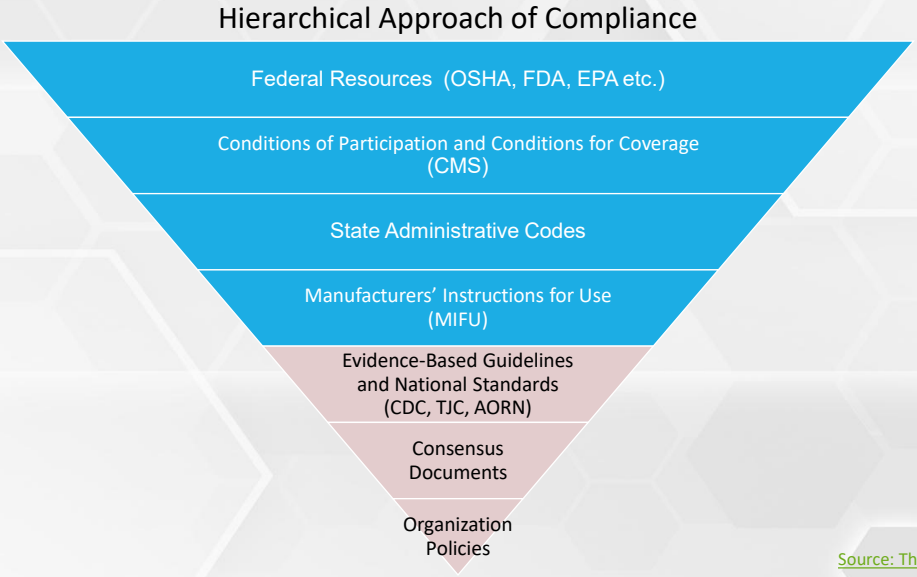
Regulation & Accreditation



Source: The Joint Commission

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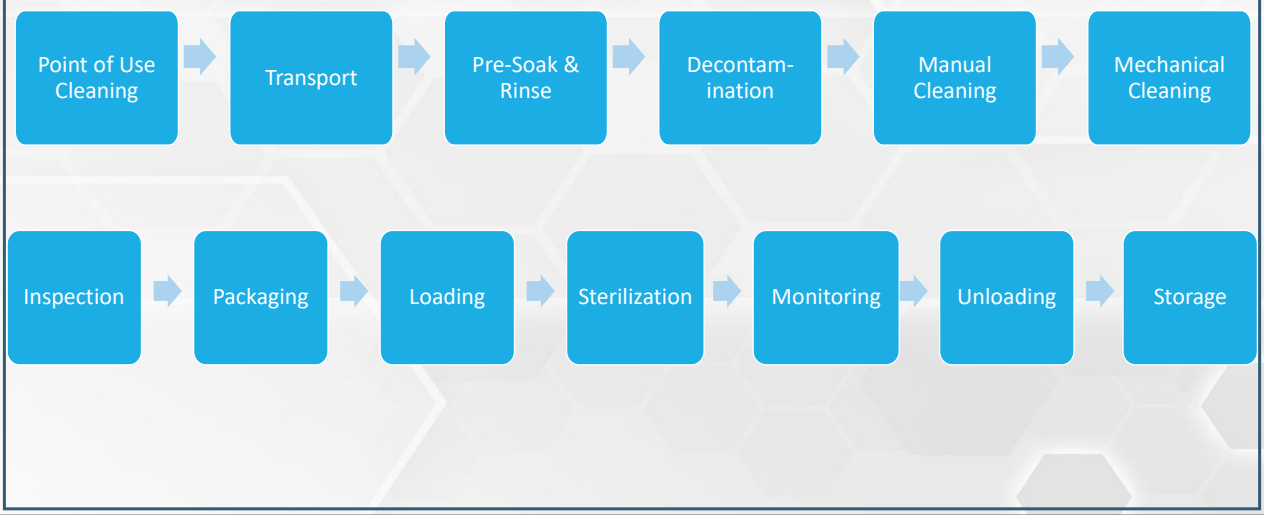
Process



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Point of Use/Pre-Cleaning

During the case:
- ✓ Wipe instruments
- ✓ Irrigate lumens
- ✓ Sterile water

After the case:
- ✓ Disassemble
- ✓ Separate sharps
- ✓ Open hinged instruments and place on stringers
- ✓ Light instruments on top
- ✓ Keep instruments moist
  - Water moistened towel
  - Humid container
  - Pre-treatment agent

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Decontamination

Cleaning:

Removes all foreign matter so disinfectant can touch the surface

- Manual
- Automated

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Manual Cleaning

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Device Preparation

Pre-treated
Gross debris removed
Sort and disassembled

Cleaning Tools

Non-linting cloths
Brushes
Single Use discarded
Disinfected daily

Technique/Safety

Fully submerge
PPE
Brush, flush, wipe

IFU

Steps vary by device
Cleaning tool IFUs
Solution IFU

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Manual Cleaning

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Does not make devices safe to handle

- ✓ Measure solution AND sink water
- ✓ Use a timer
- ✓ Change water after each “use”
- ✓ Monitor water temperature

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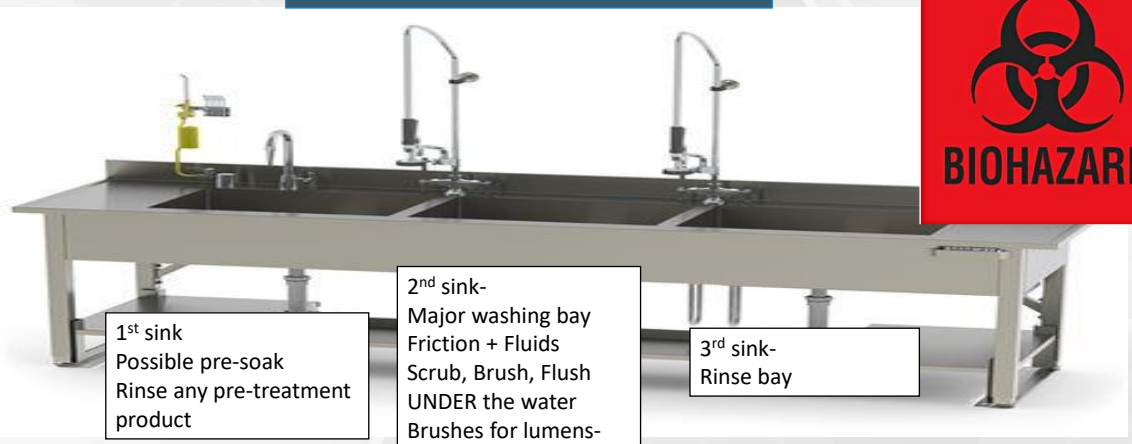
Manual Cleaning

Minimum 2 sinks- 3 Sinks preferred



1st sink
Possible pre-soak
Rinse any pre-treatment product

2nd sink-
Major washing bay
Friction + Fluids
Scrub, Brush, Flush
UNDER the water
Brushes for lumens- suitable size/ IFU

3rd sink-
Rinse bay

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Ultrasonic Cleaning

- Remove debris from hard-to-reach areas (joint, crevices, lumens)
- AFTER gross debris removed
- Detergent concentrations and temperature
- De-Gas -no instruments
- Cavitation testing
- Only approved devices (no plastic, soft or mixed metals)
- Keep lid closed
- Rinse afterwards
- Change water after each “use”
- Clean unit daily

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Cavitation

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Mechanical Cleaning

Phases: Prewash → Wash → Rinse → Thermal Disinfection → Dry

- Load per manufacturer IFU
- Hinged instruments open
- Heavier devices on bottom
- No silicone mats
- Expiration dates on solutions

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Cleaning Validation

- ✓ Most challenging spot
  - Top rack
  - Furthest from spray arm

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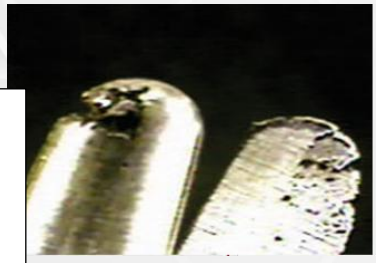
Cleaning Verification and Inspection

Visual inspection
- Optimal lighting
- Magnification
  - Damage- dents, pitting
  - Stains
  - Debris

REQUIRED



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Packaging

- Allow air removal and contact with sterilant
- Protect from contamination, tearing etc.
- Tamper evident
- Allow for aseptic presentation
- Compatible with sterilization method

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Peel Pouches

- ✓ Appropriate size- light weight, low profile
- ✓ Appropriate number of instruments
- ✓ Instruments open
- ✓ Tip protectors
- ✓ Labeled plastic side of pouch with sharpie/label
- ✓ Visible Chemical Indicator

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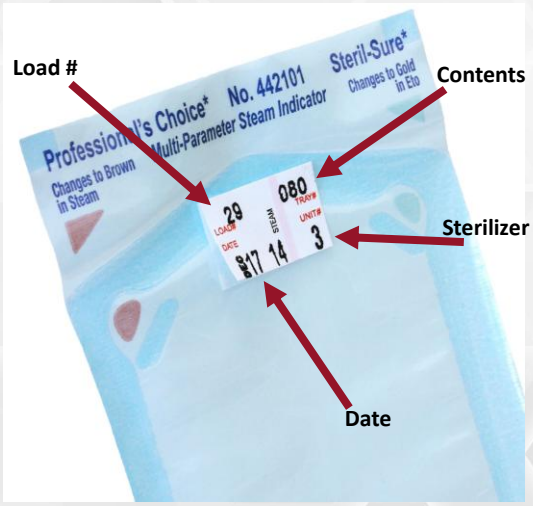
Packaging

Every package must have:

- ✓ Sterilizer number
- ✓ Cycle and load number
- ✓ Date of sterilization
- ✓ Contents
- ✓ Person who packaged
- ✓ An indicator (internal and external)



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Lets Try Packaging!

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Loading the Sterilizer

- Cycle Options
- Maintenance
- Loading parameters

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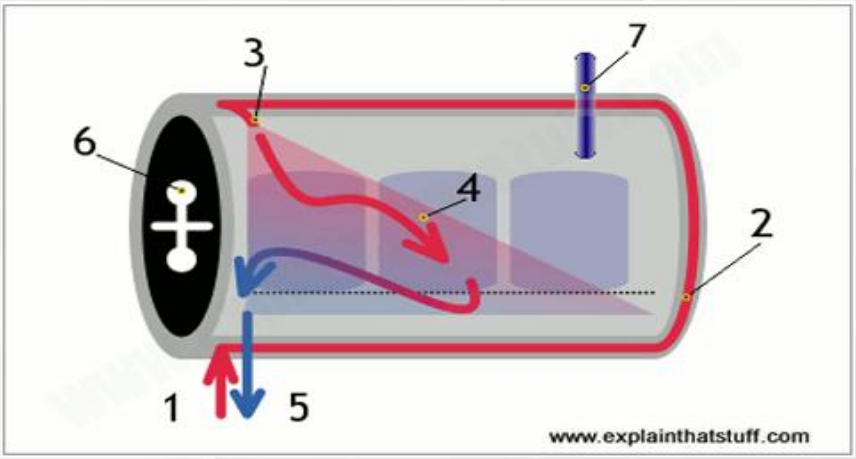
Anatomy of an Autoclave



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Autoclave Process

Conditioning Phase (Heat)

Air is removed and replaced with steam

Gravity | Pre-Vacuum | SFPP

Sterilization Phase

Steam contacts every surface

Steam kills microorganisms

Sterility achieved

Exhaust Phase

Exhaust

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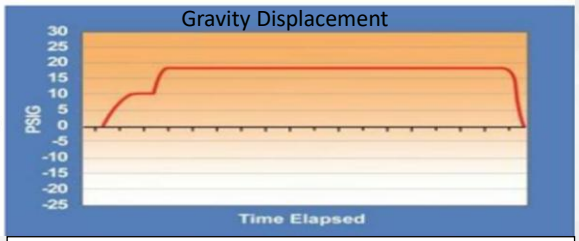
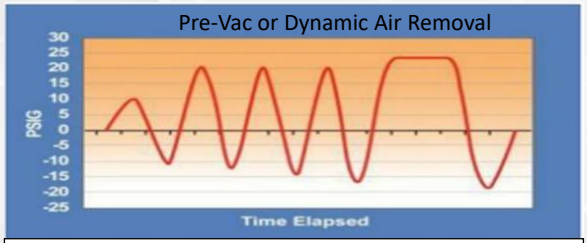
Common Cycle Parameters



- Steam displaces air in the chamber using gravity
- Steam is denser than air
- No mechanical assistance

121°C/250°F for 30 minutes
15-30 dry time
132°C/270°F for 15 minutes
15-30 dry time



- Air removed from chamber with vacuum
- Forces steam into instrument areas
- Shorter cycles
- Bowie Dick Test- make sure vacuum is adequately removing air

132°C/270°F for 4 minutes
20-30 dry time
135°C/275°F for 3 minutes

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Loading the Sterilizer

- Same cycle parameters in same load
- Configure to allow for adequate air penetration and removal
- Heavy items on bottom
- No stacking unless approved by manufacturer

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Loading the Sterilizer

- Peel packs on edge
- If you will lay flat:
  - NEVER on the bottom tray
  - Don't overlap
  - Paper side down

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Loading the Sterilizer

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Loading the Sterilizer

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Unloading the sterilizer

- Allowed to cool to room temperature
- Do not touch during cooling
- Inspect packages for moisture, damage etc.

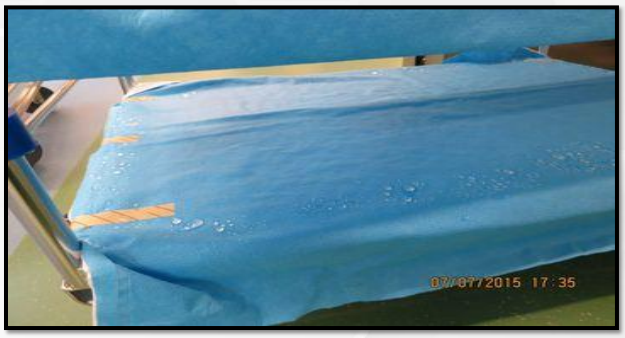

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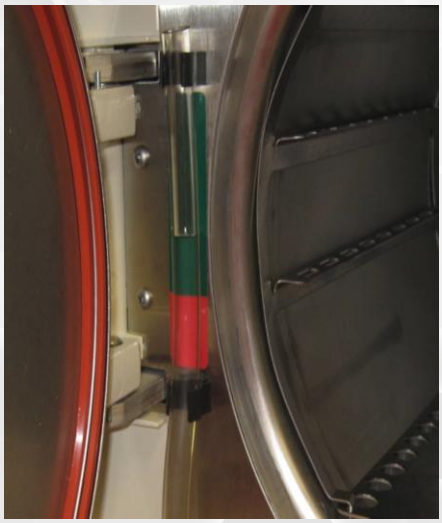
Table-Top Maintenance

Daily	Weekly	Monthly
• Distilled water only • Daily-wipe with quaternary disinfectant • Inspect gasket for damage • If use lubricants, drain and refill water daily (residue)	• Change water in unit • Remove racks and trays • Clean trays and racks with distilled water	• Clean chamber • Drain water • Speed clean cleaner • Run pouch cycle • Drain and refill • Rinse • Drain and refill • Clean filters • Clean gaskets • Test pressure release valve



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Monitoring Sterilization Loads

- Physical
- Chemical
- Biological
- Records

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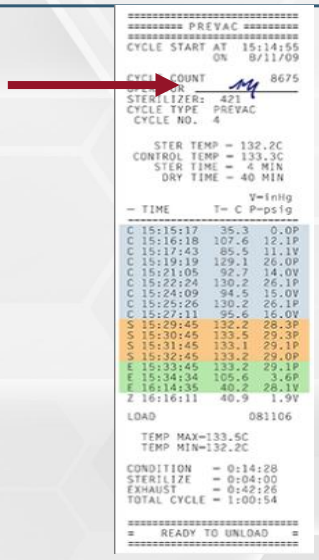
Physical Monitoring

- Time
- Temperature
- Pressure



```
==========================
========= PREVAC =========
==========================
CYCLE START AT  15:14:55
            ON   8/11/09

CYCLE COUNT          8675
STERILIZER:  421
CYCLE TYPE   PREVAC
 CYCLE NO.   4

    STER TEMP = 132.2C
 CONTROL TEMP = 133.3C
    STER TIME =  4 MIN
     DRY TIME = 40 MIN

                    V=inHg
- TIME        T- C P-psig
--------------------------
C 15:15:17   35.3   0.0P
C 15:16:18  107.6  12.1P
C 15:17:43   85.5  11.1V
C 15:19:19  129.1  26.0P
C 15:21:05   92.7  14.0V
C 15:22:24  130.2  26.1P
C 15:24:09   94.5  15.0V
C 15:25:26  130.2  26.1P
C 15:27:11   95.6  16.0V
S 15:29:45  132.2  28.3P
S 15:30:45  133.5  29.3P
S 15:31:45  133.1  29.1P
S 15:32:45  133.2  29.0P
E 15:33:45  133.2  29.1P
E 15:34:34  105.6   3.6P
E 16:14:35   40.2  28.1V
Z 16:16:11   40.9   1.9V

LOAD              081106

  TEMP MAX=133.5C
  TEMP MIN=132.2C

CONDITION   = 0:14:28
STERILIZE   = 0:04:00
EXHAUST     = 0:42:26
TOTAL CYCLE = 1:00:54

==========================
=    READY TO UNLOAD     =
==========================
```

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Chemical Monitoring

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Chemical Indicator (CI)

- Daily Air Removal Test
- Internal CI
- External CI

Biological Indicator (BI)

- Process Challenging Device
- Biological Indicator
- Control

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Chemical Indicators

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*Class 1

Process/ External

*Class 2

Specific Use (Bowie Dick to check air removal)

Class 3

Single-variable (EO)

Class 4

Multi-variable 2 or more

*Class 5

Integrating

All critical parameters

Class 6

Emulating

Specific cycle parameters

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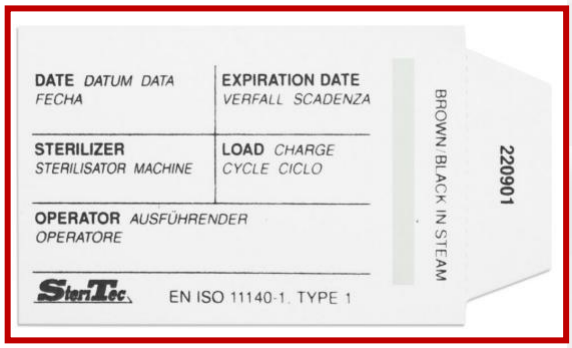
External Chemical Indicators



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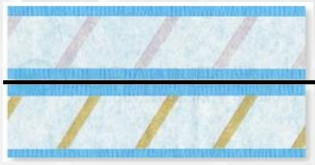
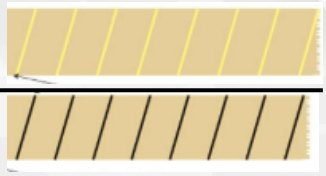
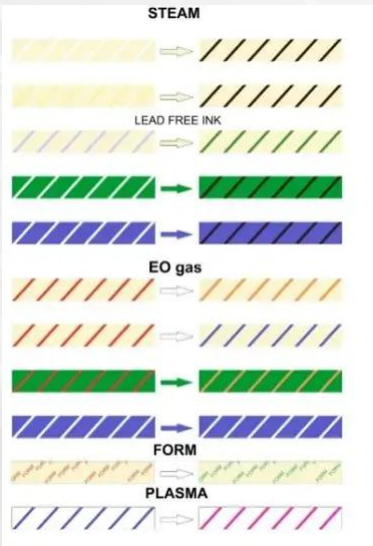
Alternative Sterilization Methods



Not-sterilized

Sterilized





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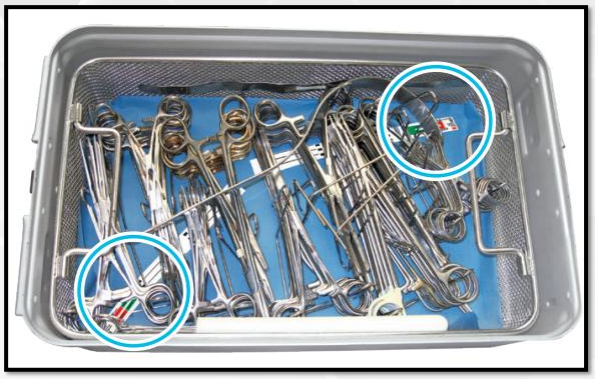
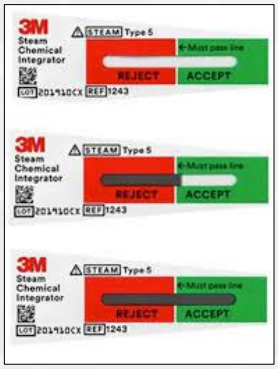
Internal Chemical Indicators





Internal Chemical Indicator should be placed so that:

- At least ONE CI is visible to the person opening the package
- In the area or areas considered least accessible to steam penetration
- In accordance with all applicable written IFU

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Dynamic Air Removal Test

Daily Air Removal Test (DART)/Bowie Dick

Purpose: Detects effective air removal

- Type 2 CI
- Every day **pre-vac** sterilizer used
- BEFORE first processed load
- Test same time every day
- Commercially available or facility
- Place over drain in **empty** chamber

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Biological Monitoring

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Confirm Destruction of Spores

Biological Indicator (BI)

- Process Challenging Device
- Biological Indicator
- Control

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Biological Indicators

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- ✓Weekly (minimum)
- ✓Inside a Process Challenging Device (PCD)
- ✓Sample and Control from the SAME lot
  - ✓Control placed in incubator
  - ✓Test placed in sterilization cycle
- ✓Control should ➕
- ✓Test should be ➖
- ✓Documentation REQUIRED

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Process Challenging Device

Purpose: Test to test ability to kill spores

- Qualification and regular monitoring
- Commercially or facility assembled
- Ran in a **loaded** chamber
- Flat on the sterilizer cart
- Area of greatest challenge (Cold point)
    - Center or front of chamber
        - varies by manufacturer

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Common Challenges

Delays in point of use cleaning	Decentralized Sterilization	Single-use instruments undergo reprocessing	Incomplete cleaning	Complex or damaged instruments
Inadequate drying and packaging	Sterilizer loading/unloading	Staff Turnover	Training & Education	Device Purchasing
Conflicting IFUs	Reprocessing Space	Enough sets for case volume	Immediate-use Steam Sterilization (IUSS)	Appropriate Storage

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Common Challenges

Questions

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IPC Resources

CDC Disinfection and Sterilization Guideline	https://www.cdc.gov/infection-control/hcp/disinfection-and-sterilization/index.html
Disinfection & Sterilization (William Rutala)	https://disinfectionandsterilization.org/
Healthcare Sterile Processing Association	https://myhspa.org/
Centers for Disease Control and Prevention. Summary of Recommendations: Disinfection and Sterilization in Healthcare Facilities	https://www.cdc.gov/infection-control/hcp/disinfection-sterilization/summary-recommendations.html
Steris Knowledge Center	https://www.steris.com/healthcare/knowledge-center
American Academy of Ophthalmology TASS Resources	https://www.aao.org/assets/df424a5c-a186-4cff-b307-d50b7368b241/635266898473330000/tass-resources-revised-2012-pdf
The Association for the Advancement of Medical Instrumentation	https://www.aami.org/
SHEA Mult society guidelines	https://shea-online.org/guidance/multisociety-guidance-for-sterilization-and-high-level-disinfection/
TJC HLD and Sterilization Booster Pak	https://sdapic.org/wp-content/uploads/2015/12/TJC-HLD-BoosterPak-Dec-2015.pdf

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