What is happening inside that magic box?
Fundamentals of vaporized hydrogen peroxide sterilization in health care facilities

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Disclosure

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Objectives

1. Identify options for vaporized hydrogen peroxide sterilization available to health care facilities

2. Recognize significant variables that effect vaporized hydrogen peroxide sterilization in health care facilities

3. Describe quality assurance procedures for vaporized hydrogen peroxide sterilizers in health care facilities
Sterilization processes in healthcare
Why we use steam so much!

- Fast
- Effective
- Inexpensive
- Easy to use
- Readily available
- Technology well understood
- No toxicity or hazardous residues
- Compatible with many devices

Robust - *capacity to remain unaffected by small variations in procedural parameters* modified from USP 39 NF 34 *General Information {1225} Validation of Compendial Procedures*
When steam is too extreme...
Low temperature sterilization

Sterilization process using chemical gases or vapors at lower temperatures to process heat and moisture sensitive instruments

- Ethylene Oxide (EO)
- Hydrogen Peroxide (H₂O₂)
- Hydrogen Peroxide (H₂O₂) + Ozone (O₃)

Vaporized hydrogen peroxide sterilization

Advantages
- High efficacy
- Rapid activity
- Cost effectiveness
- Monitoring capability

Limitations
- Materials compatibility
- Adaptability
- Penetrability
- Organic material resistance
- Toxic
Steam sterilization kills with latent heat

Steam condensation on surfaces releases latent heat (energy) that damages and destroys large biochemical molecules required for life

- Proteins denatured
- Nucleic acids damaged

**GAS**

2257 kJ/kg latent heat energy!

**LIQUID**

physical pounding!
Hydrogen peroxide kills by oxidation

Oxidation occurs when an atom LOSES electrons

The atom is the basic building block for molecules

Destroys membrane lipids, DNA, other essential cell molecules

chemically ripped apart!
**Fun facts: hydrogen peroxide**

- Discovered in 1818 - Thénard
- Naturally in milk, honey, ordinary tissues with normal cell function
- Wastewater applications 1970’s
- STERIS VHP process mid-1980’s
- ASP® STERRAD® 50 510(k) 1999

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**WARNING! HYDROGEN PEROXIDE IS CORROSIVE**
Concentrated hydrogen peroxide is corrosive to skin, eyes, nose, throat, lungs, and the gastrointestinal tract. Always wear chemical resistant latex, PVC (vinyl), or nitrile gloves when removing items from the sterilizer following a cancelled cycle or if any moisture is noted on items in the load following a completed cycle.

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<table>
<thead>
<tr>
<th>H₂O₂ Concentration</th>
<th>Products and Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;52%</td>
<td>Contact lens sterilizer (2%)</td>
</tr>
<tr>
<td>52-91%</td>
<td>VAPROX® HC Sterilant for STERIS® AMSCO® V-PRO® Sterilizers (59%)</td>
</tr>
<tr>
<td>&gt;91%</td>
<td>Rocket propellant (&gt;70%)</td>
</tr>
</tbody>
</table>

Specialty applications and uses (52–91%)
Vaporized hydrogen peroxide sterilizer options

Advanced Sterilization Products (ASP)®

• STERRAD® 100S Sterilization System
  • U.S. 510(k) K991999 6/2000 (17 years ago)
  • 1 cycle option today
  • Standard Cycle 55 min - most general surgical instruments

• STERRAD™ NX™ Sterilization System
  • U.S. 510(k) K042116 4/2005 (12 years ago)
  • 2 cycles options today
  • Standard Cycle 28 min - most general surgical instruments
  • Advanced Cycle 38 min - smaller diameter and longer lumens

ASP is a trademark of the Division of Ethicon US, LLC, a Johnson & Johnson company
STERRAD is a trademark of Advanced Sterilization Products.
Vaporized hydrogen peroxide sterilizer options

Advanced Sterilization Products (ASP)®

- **STERRAD® 100NX Sterilization System**
  - U.S. 510(k) K071385 11/2007 (10 years ago)
  - 4 cycle options today
  - **STANDARD Cycle** 47 min - general surgical instruments
  - **DUO Cycle** 60 min - single-channel flexible endoscopes / light cords / cameras
  - **EXPRESS Cycle** 24 min - da Vinci® 3-D endoscopes / other instrument without lumens
  - **FLEX Cycle** 42 min - two single-channel flexible endoscopes

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STERRAD is a trademark of Advanced Sterilization Products.
da Vinci is a trademark of Intuitive Surgical
Vaporized hydrogen peroxide sterilizer options

STERIS®

• V-PRO® maX Low Temperature Sterilization System
  • U.S. 510(k) K102330 10/2011 (6 years ago)
  • 3 cycle options today
    • Non Lumen Cycle 28 min - general surgical instruments
    • Flexible Cycle 35 min - single or dual channel flexible endoscopes
    • Lumen Cycle 55 min - single, dual and triple channeled rigid and semi-rigid endoscopes

• V-PRO® 1 Plus Low Temperature Sterilization System
  • U.S. 510(k) K083097 8/2009 (8 years ago)
  • 2 cycle options today
    • Non Lumen Cycle 28 min - general surgical instruments
    • Lumen Cycle 55 min - single, dual and triple channeled rigid and semi-rigid endoscopes

V-PRO® maX  V-PRO® 1 Plus  VAPROX®HC Sterilant
Vaporized hydrogen peroxide sterilizer options

STERIS®

- **V-PRO® 1 Low Temperature Sterilization System**
  - U.S. 510(k) K062297  10/2007  (10 years ago)
  - 1 cycle option today
  - Standard Cycle  55 min - general surgical instruments / single lumens

- **V-PRO® 60 Low Temperature Sterilization System**
  - U.S. 510(k) K140498  7/2014 (3 years ago)
  - 3 cycle options today
  - Non Lumen Cycle  28 min - general surgical instruments
  - Flexible Cycle  38 min - single or dual channel flexible endoscopes
  - Lumen Cycle  60 min - single, dual and triple channeled rigid and semi-rigid endoscopes

V-PRO is a trademark of STERIS Corporation  STERIS is a trademark of STERIS Corporation
Vaporized hydrogen peroxide sterilizer options

Getinge

- **STERIZONE® VP4 Sterilizer (hydrogen peroxide + ozone)**
  - U.S 510(k) K141163 12/2014 (3 years ago)
  - 1 cycle option today
  - Cycle 1 46 – 70 min - general surgical instrument / two double-channel and one single-channel or one multi-channel flexible endoscope.

125-280 Solution™ (H₂O₂ 50 wt%)
8.4-24 g injected/phase

STERIZONE® VP4 Sterilizer

STERIZONE is a trademark of TS03 company
**Vaporized hydrogen peroxide cycles**

- **Different technologies: different cycles**
- **Some commonalities (adapted AAMI ST58)**

1. Evacuate
2. Inject Sterilant (vaporized liquid $\text{H}_2\text{O}_2$)
3. Sterilant Exposure (static, no make-ups)
4. Vent (diffuse air into chamber & load)
5. Evacuate
6. Repeat $\text{H}_2\text{O}_2$ injections 2 - 4 times
7. After last injection, aeration or a plasma phase to remove $\text{H}_2\text{O}_2$ residuals

*Example: STERIS® V-PRO® Lumen Cycle*
Vaporized hydrogen peroxide delivery methods

- Different technologies: different H$_2$O$_2$ delivery methods

1. Fixed Volume Injection
   - Single-dose capsules

2. Dynamic Injection*
   - Multiple use bottle

* Total amount of H$_2$O$_2$ introduced into the sterilization chamber and thus the duration of the injection varies depending on the load’s size (e.g., surface area or weight), packaging and material composition, and temperature.

All technologies have static sterilant exposure (dwell) phases

No sterilant make-up in exposure like steam
Significant variables that may affect vaporized hydrogen peroxide sterilization in health care facilities
Standard for effective use of vaporized hydrogen peroxide

• Reference Document

• ANSI/AAMI ST58:2013 - Chemical sterilization and high-level disinfection in health care facilities
ANSI/AAMI ST58:2013
• Effective use vaporized hydrogen peroxide (Annex H.3)
  a) Device & sterilizer manufacturers’ written IFUs
  b) No cellulose-based products (towels, gauze, or paper)
  c) Lumen sizes cleared by the FDA (based on model + cycle)
  d) Devices should be thoroughly cleaned and dried
  e) Hinged instruments should be opened
  f) Tyvek®-Mylar® pouches, polypropylene wrap, or reusable rigid containers
  g) Trays and mats per IFU and cleared by the FDA
  h) Ensure adequate sterilant contact, follow all loading recommendations
  i) CI’s and *Geobacillus stearothermophilus* BIs cleared by FDA to monitor
Observed variations in practice affecting performance

- Sterilizer chamber loading practices
- Rigid container weights
- Placement of biological indicators
- Adequacy of drying
- Materials compatibility (packaging and devices)
Chamber loading practices

To ensure *adequate sterilant contact*, personnel should load the sterilizer as recommended in the sterilizer manufacturer’s written IFU (AAMI ST58)

*Example*

- STERRAD® 100S* allow 1 inch from top of load and the electrode
- STERRAD® 100S* allow 1 inch between packages in the load
- STERRAD® 100S* place packages flat on shelves in a single layer
- STERRAD® 100S* do not stack trays

*STERRAD® 100S Instrument Processing Guidelines AD-51825-01 US_C
STERRAD is a trademark of Advanced Sterilization Products
Chamber loading practices

Example

STERRAD® 100NX® Express cycle

EXPRESS
Load Preparation: Bottom shelf only
(10.7 lbs or 4.85 kg)

Empty top shelf

Bottom shelf only

*STERRAD® 100NX System Cycle Selection AD-090152-0-CT_C
STERRAD is a trademark of Advanced Sterilization Products
### sterilizer chamber loading weights

<table>
<thead>
<tr>
<th>Model</th>
<th>Cycle</th>
<th>Weight (lb)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>STERRAD®100S</td>
<td>Standard (default) ¹</td>
<td>Not defined</td>
<td></td>
</tr>
<tr>
<td>STERRAD®100NX</td>
<td>FLEX</td>
<td>21.4</td>
<td>2 flexible scopes, no additional load</td>
</tr>
<tr>
<td></td>
<td>EXPRESS ³</td>
<td>10.7</td>
<td>Bottom shelf only!</td>
</tr>
<tr>
<td></td>
<td>DUO ³</td>
<td>13.2</td>
<td>2 flexible scopes &amp; access.</td>
</tr>
<tr>
<td>GETINGE VP4</td>
<td>Cycle 1 ³</td>
<td>75.0</td>
<td>Mixed loads allowed</td>
</tr>
</tbody>
</table>

¹ Limits on weight and device types per models and cycles is complex! Always refer to the sterilizer manufacturer’s instructions for use.

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STERRAD is a trademark of Advanced Sterilization Products.
V-PRO is a trademark of STERIS Corporation
STERIS is a trademark of STERIS
STERIZONE is a trademark of TS03 company

1. FDA 510(k) K111377 _ Summary
2. FDA 510(k) K160818 _ Summary
3. FDA 510(k) K160903 _ Summary
4. FDA 510(k) K160433 _ Summary
5. STERIZONE® VP4 Low Temperature Sterilizer Brochure

www.accessdata.fda.gov
## Container manufacturers’ recommended weights

### Example

<table>
<thead>
<tr>
<th>Container brand</th>
<th>Half-Size Containers</th>
<th>Depth (inch)</th>
<th>STERRAD® 100S Weight (lb) Excluding Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Braun Aesculap® SterilContainerS™ System</td>
<td>4.5</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td>Case Medical SteriTite®</td>
<td>8.0</td>
<td>contents</td>
<td></td>
</tr>
</tbody>
</table>

*Do not use nylon coated brackets or silicone mat.

V. Mueller and Genesis are trademarks of CareFusion Corporation. Aesculap and SterilContainer is a trademark of the B. Braun Corp. SteriTite is a trademark of Case Medical.

Rigid container weight limits vary!

Verify limits per container manufacturer IFU, container size, sterilizer model, and sterilizer cycle!
Placement of biological indicators - STERRAD® ASP® STERRAD® Cyclesure® 24

- most challenging area for the sterilant to reach
- typically shelf close to the rear of the sterilizer
- white Tyvek® side should be facing up
- pouch may be placed on top of a wrapped instrument tray

Activate immediately
Final result in 24 hours

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STERRAD is a trademark of Advanced Sterilization Products.

*How to Use the STERRAD® CYCLESURE® 24 Biological Indicator AD-51868-01-US_F
Placement of biological indicators - STERRAD®
STERIS® Verify® V24 SCBI

2. Place one (1) biological indicator (BI) in the pouch with one (1) chemical indicator (CI). Seal the pouch.

3. STERRAD® Systems: Place pouch at the back of the bottom shelf.

Use pouches and CIs that have been cleared for use in the sterilizer being tested.

If not immediate, activate within 72 hours if stored at room temperature

Final result in 24 hours
Placement of biological indicators – V-PRO®
STERIS® Verify® V24 SCBI

Place one (1) biological indicator (BI) in the pouch with one (1) chemical indicator (CI). Seal the pouch.

Use pouches and CIs that have been cleared for use in the sterilizer being tested.

V-PRO® Systems:

a) Two Shelves: Place pouch at the center of the top shelf.
b) One Shelf: Place pouch at bottom shelf front door.

If not immediate, activate within 72 hours if stored at room temperature

Final result in 24 hours
Placement of biological indicators - STERRAD® and V-PRO®

3M™ Attest™ Rapid Readout Biological Indicator 1295

Activate within 1 hour of the completion of the cycle

Final result in 24 minutes or 4 hours
Interpreting VH₂O₂ biological indicators results

- ASP Sterrad® Cyclesure® 24
- Steris Verify® V24 SCBI
- 3M Attest™ Rapid Readout BI 1295

6. After Incubation

After 24 hours, check both CYCLESURE® 24 BI vials and record the results in the STERRAD® Sterilization Log.

If the processed CYCLESURE 24 BI solution changes color from purple to yellow (as in the positive control vial), and/or exhibits turbidity, this indicates that conditions for sterilization have not been met. Proceed to step 7.

...and / or exhibits turbidity...
Adequacy of drying

• “Devices should be thoroughly cleaned and dried before sterilization because excessive moisture can cause cycle cancellation” (AAMI ST58)

• “If the load is not properly dried, effective sterilization may not be achieved…because of localized cold spots...condensing vaporized $\text{H}_2\text{O}_2$”

HPN Self-Study *Using HPG sterilization for heat-sensitive devices*, Jan 2015, Nancy A. Robinson, Ph.D. and Randal W. Eveland, Ph.D.
Materials compatibility

- No cellulose-based products
- Absorptive of H\textsubscript{2}O\textsubscript{2}
- Can result in cycle cancellations
- Cellulose-based products
- (AAMI ST58)
  - towels
  - gauze
  - paper
  - muslin

- Precedent set for U.S. FDA cleared hydrogen peroxide indicator products to contain cellulose

STERRAD® SEALSURE® Chemical Indicator Tape

3M™ Attest™ Rapid Readout Biological Indicator 1295

STERRAD and SEALSURE are trademarks of Advanced Sterilization Products
Materials compatibility

“The medical device and sterilizer manufacturers’ written IFU should be consulted to determine the compatibility of the device with hydrogen peroxide gas sterilization” (AAMI ST58)
Materials compatibility – observed variation

“…Tyvek®-Mylar® pouches, polypropylene wrap, or reusable rigid sterilization container systems cleared by the FDA…” (AAMI ST58)

Over time surface damage/wear and tear of trays and rigid metal containers can affect compatibility in vaporized hydrogen peroxide.
Materials compatibility - real world scenario

• Background
  • STERRAD® 100S Sterilizer
  • Tens of thousands of cycles
  • Preventative maintenance current
  • Vaporizer plate changed routinely

• Problem
  • Intermittent automatic cycle cancelations
  • Message: *Low Pressure In Injection*
  • Intermittent positive biological indicators
  • Intermittent incomplete chemical indicators
Materials compatibility - real world scenario

- **Root Cause Investigation**
- **Low Pressure In Injection**
- Corresponds to the vaporized $\text{H}_2\text{O}_2$ in the chamber
- Automatic cycle cancel <6torr for an injection pressure
- Further review of cycles reveals many cycles with injection stages close to failure 6–7torr
Materials compatibility - real world scenario

- Root Cause Investigation
- Review of load and cycle records indicated a trend in a load
- Load:
  - 2 plastic trays
  - 2 cameras and 2 light cords
  - Wrapped disposable blue wrap
- Operator's manual troubleshooting tip for this fault: “Load may contain cellulose, linen, paper pouch, or other absorbent materials. Check load, repackage, and restart the sterilizer”
Materials Compatibility - Real World Scenario

- Root Cause Investigation Cont.
- Bottom & lid of plastic tray were from different manufacturers
- Lid compatible w/ STERRAD® 100S
- Could not confirm compatibility bottom of tray

- Switched to Aptimax® trays
- Doubled load size (4 cameras)!
- Cycle cancellations stopped!
- Negative biological indicators!
- Complete color change CI’s!
Discuss standards and guidelines for monitoring vaporized hydrogen peroxide sterilizers
Standards and guidelines for monitoring vaporized hydrogen peroxide

Reference Documents

- ANSI/AAMI ST58:2013 – “Chemical sterilization and high-level disinfection in health care facilities”

- AORN – “Guidelines for Perioperative Practice”
  - 2016 Edition
  - Guideline for Sterilization (2016)
AAMI ST58:2013  Section 9 Quality Control

- 9.5 monitoring gaseous chemical sterilization processes
  
  - Physical Monitors
  - Chemical Indicators
  - Biological Indicators
AAMI ST58:2013 Section 9 Quality Control

9.5 monitoring gaseous chemical sterilization processes

- Physical Monitors

... physical monitoring and other indicators of sterilizer performance should never be considered a substitute for careful adherence to prescribed packaging and loading procedures ... (AAMI ST58)

- end of the cycle examine and interpret
- verify cycle parameters met and initial
AAMI ST58:2013 Section 9 Quality Control

- Recommended Chemical Indicator (CI) Usage
- Exposure Control:
  - external CI on every package

“Using chemical indicators
.....A CI should be used on the outside of each package unless the internal indicator is visible...”

– AAMI ST58:2013, Section 9.5.3.2
AAMI ST58:2013 Section 9 Quality Control
• Recommended Chemical Indicator (CI) Usage
• Pack Control: internal CI inside every package, tray, containment device, cassette, instrument tray

“Using chemical indicators
…. The CI should be placed in that area of the package, tray, or containment device that creates the greatest challenge to sterilant penetration…”

- AAMI ST58:2013, Section 9.5.3.2
AAMI ST58:2013 Section 9 Quality Control

• Biological Indicators

• 9.5.4.1 General considerations
  “…Biological indicators are intended to demonstrate whether the conditions were adequate to achieve sterilization.”

• 9.5.4.3 Frequency of use…
  • “A PCD with the appropriate BI should also be used at least daily, but preferably in every sterilization cycle (see 9.5.4.5)”
  • Each load containing implantable..
  • - AAMI ST58:2013, Section 9.5.4.3
AORN Guideline for Sterilization (2016)

• Low-temperature hydrogen peroxide gas plasma sterilizers and hydrogen peroxide vapor sterilizer
  • *Geobacillus stearothermophilus* biological indicators
  • routine load release
  • routine sterilizer efficacy monitoring
  • sterilizer qualification testing,
  • period product quality assurance testing

2016 AORN Guideline for Sterilization, Recommendation XX.h.4

AORN: routine BI testing at least daily on each cycle type, preferably with each load
# Routine sterilizer efficacy monitoring vaporized hydrogen peroxide sterilizers

<table>
<thead>
<tr>
<th>Modality</th>
<th>AAMI</th>
<th>AORN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen Peroxide (H₂O₂) Gas Plasma Sterilizer</td>
<td>PCD with BI daily but preferably every cycle</td>
<td>At least daily on each cycle type, preferably with each load (XX.h.4)</td>
</tr>
<tr>
<td>Hydrogen Peroxide (H₂O₂) vapor sterilizer</td>
<td>PCD with BI daily but preferably every cycle</td>
<td>At least daily on each cycle type, preferably with each load (XX.h.5)</td>
</tr>
</tbody>
</table>

- **AAMI**—Association of Advancement Medical Instrumentation AAMI/ST58:2013
AAMI ST58:2013 Section 9 Quality Control

- Section 9 Quality Control
- Daily Control BI

- Acceptance criteria:
  - Negative result from test BI
  - Positive result from control BI
  - Appropriate readings from physical monitors
  - CI with acceptable end-points control

- AAMI ST58:2013, Section 9.5.4.5.3
AAMI ST58:2013 Section 9 Quality Control

9.5.4.6 Positive biological indicator results

“b) Because a sterilization failure has occurred, items processed in that sterilizer since the sterilization cycle having the last negative BI should be considered nonsterile. They should be retrieved, if possible, and reprocessed. The sterilizer in question should be taken out of service.”

- AAMI ST58:2013, Section 9.5.4.5.6 b)
Summary

1. Sterilization with steam is different than chemical sterilization. The mode of action for vaporized hydrogen peroxide sterilization is through the chemical process of oxidation.

2. Health care facilities have many options for vaporized hydrogen peroxide sterilization, they all have advantages and limitations. Manufacturers’ IFU should be followed to prevent failures in monitoring products.

3. The AAMI document ST58 covers chemical sterilization and high-level disinfection in health care facilities. AORN also provides sterilization monitoring recommendations for hydrogen peroxide sterilizers in health care facilities.
Thank you
References

Association of Perioperative Registered Nurses (AORN) Guidelines for Perioperative Practice (2016)

• Guideline for Sterilization
• Guideline for Selection and Use of Packaging Systems for Sterilization
How to Purchase AORN Standards for Your Reference Library

• AORN standards can be purchased through AORN using the following options:

• Internet: https://www.aornbookstore.org/

• Call: 1-800-755-2676 x 1 or 303-755-6304 x 1 (Monday-Friday, 8AM To 4:30PM MST)

• Fax: 303-750-3212

• By mail: AORN, Inc., Customer Service/Book Orders, 2170 South Parker Road, Suite 400, Denver, CO 80231, USA
References

• Association for the Advancement of Medical Instrumentation (AAMI)

• ANSI/AAMI ST58:2013 - Chemical sterilization and high-level disinfection in health care facilities
How to Purchase AAMI Standards for Your Reference Library

• AAMI documents can be purchased through AAMI by credit card using the following four options:
  
  • Internet;
    
    http://www.aami.org/productspublications/ProductDetail.aspx?ItemNumber=1383
  
  • Call: 1-877-249-8226  Fax: 301-206-9789
  
  • Mail: AAMI Publications, P.O. Box 0211, Annapolis Junction, MD 20701-0211
Additional References

- USP 39 NF 34 *General Information (1225) Validation of Compendial Procedures*


- User’s Guide STERRAD® NX Sterilization System Ref 99920 (STERRAD is a trademark of Advanced Sterilization Products)


- STERIS® AMSCO V-PRO 1 AND AMSCO V-PRO 1 PLUS LOW TEMPERATURE STERILIZATION SYSTEM Technical Data Monograph (V-PRO is a trademark of STERIS Corporation STERIS is a trademark of STERIS Corporation)
Additional References

- .03 Rev. B ©2015 STERIS Corporation STERIZONE® VP4 Low Temperature Sterilizer Product Specification (STERIZONE is a trademark of TS03 company)
- STERRAD® 100S Instrument Processing Guidelines AD-51825-01 US_C (STERRAD is a trademark of Advanced Sterilization Products)
- STERRAD® 100NX System Cycle Selection AD-090152-0-CT_C STERRAD is a trademark of Advanced Sterilization Products
- www.accessdata.fda.gov FDA 510(k) summaries FDA 510(k) K111377 _ Summary, FDA 510(k) K160818 _ Summary, FDA 510(k) K160903_ Summary, FDA 510(k) K160433_ Summary
- STERIZONE® VP4 Low Temperature Sterilizer Brochure
- Carefusion® V.Mueller® Genesis Containers Instructions for Use
- B.Braun Aesculap® SterilContainerS™ System Instructions for Use
- Case Medical SteriTite® Instructions for Use
- How to Use the STERRAD® CYCLESURE® 24 Biological Indicator AD-51868-01-US_F
- Reference Document # M3997EN.2015
Additional References

• HPN Self-Study *Using HPG sterilization for heat-sensitive devices*, Jan 2015, Nancy A. Robinson, Ph.D. and Randal W. Eveland, Ph.D.

• July 24, 2014 – Olympus Alerts and Statements - *Compatibility of Olympus® Small Diameter Flexible Endoscopes, Camera Heads and Accessories with the STERRAD® NX Sterilizer: Technical Information for Olympus® and Gyrus ACMI Customers in the United States*