The BPE 2009 / 2012 Edition

New Requirements and Resources for Bioprocess Systems Design

High Purity Days
June 6th 2012
Who is this guy?

• 1977 - Tom Winter joins Swagelok
• 1983 - Tom Winter establishes Cardinal Systems, Inc to meet needs for semiconductor, fiber optics and pharmaceutical industries
• 1990 - Cardinal purchased by Alfa Laval Tri-Clover, Inc
• 1999 - Cardinal purchased by O’Brien Corporation
• 2002 - Winter Technologies LLC is formed
Winter Technologies
Markets Served

Hygienic and UHP tubing and fittings
What is ASME BPE and Why is it Important???

BPE = BioProcessing Equipment
ASME BPE Scope

• To define the requirements of the bioprocessing, pharmaceutical and other industries requiring high levels of hygienic quality.

• To list subjects of materials, design, fabrication, inspections, testing, and certification.
Familiar BPE Topics:

**Dimensions & Tolerances**

**Weld profiles**

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### Fittings and Process Components

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**Table DT-7**

Automatic Tube Weld: 90 deg Elbow

### Table DT-8

Automatic Tube Weld: 45-deg Elbow

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**Table DT-9**

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**Table DT-10**

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<td>158.8</td>
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Voluntary **Consensus** Standard

- Developed and maintained by a balanced group of experts
- Multiple stages of approval before publication
- Continuously updated to support industry accepted practices
- Corrections and clarifications can be requested by anyone
ASME BPE Committee Structure

- BPE Main Committee
- Executive Committee

- General Requirements
- Design for Sterility & Cleanability
- Dimensions & Tolerances
- Surface Finish
- Seals
- Process Instrumentation
- Polymers & Elastomers
- Material Joining
- Metallic Materials of Construction
- Certification

Task Groups
BPE Standards Committee (Main Committee)

• Meets 3 times annually to:
  – Review Subcommittee Progress
  – Coordinate Efforts Between Subcommittees
  – Delegates from Europe and Asia participate
  – Liaison Reports with other Organizations

ISPE    ASTM    DIN
P3-A    3-A SSI   EHEDG
BPE 2012 - New Content Harmonization

- Overhaul of the whole Standard
- Part GR Introduction and Scope of Standard
- Part CR Certification Program
- Part SD whole Layout
- Part DT complete redesign
- Part MM international specification
- Part PM Easier to navigate
- Part PI focus on requirements
- Part SG completely reorganized
- Part SF renumbering
General Requirements (Part GR)

- Revised Introduction and Scope
- Clarifies and expands the Scope of the Standard
- New reference to ASME B31.3 Chapter X, High Purity Piping
- New definitions
- All reference to documentation has been relocated here

Defining the Technology

- bioburden
- mechanical seal
- corrosion
- biofilm
- rouge
- cleanable
- passivation
BPE Certification Program (Part CR)

• Certificate of Authorization issued to qualified component suppliers.
• ASME BPE Symbol Stamp
• 1st tubing and fitting
Dimensions & Tolerances (Part DT)

- Sub-Sections formatted to meet current ASME numbering guideline
- Purpose and Scope redefined
- New tables for shorter length conc and ecc reducers
- Type A and Type B Ferrules separate tables
Metallic Materials (Part MM)

- Metallic materials commonly used in hygienic service
  - German specifications added
  - New alloy table for US and European alloys
Material Joining
(Part MJ)

- Sample weld criteria new "COLOR" chart for weld acceptance for EP and Mech polish
- Aligned with ASME B-31.3 High Purity Piping
- Difference between Examination and Inspection
- New vision test criteria
Figure MJ-8.4-2 Discoloration Acceptance Criteria for Weld Heat-Affected Zones on Electropolished 316L Tubing

Sample # 1a  Sample # 4  Sample # 5

- Weld heat-affected zones on electropolished 316L tubing having discoloration levels no worse than Samples # 1 through # 4 in the as-welded condition are acceptable. Heat-affected zone discoloration levels more severe than that shown in Sample # 4 are unacceptable. Sample # 5 shows an unacceptable weld and heat-affected zone for comparison. The reader is cautioned that the colors observed during direct visual examination or borescope examination will be different viewing directly down (90 degrees) at the surface compared with viewing at a lower angle along the edges.

- **General Notes:** The user is cautioned that electronic versions or photocopies of these acceptance criteria shall not be used for evaluation of sample or production welds since subtle differences in color can influence weld acceptability. Non-mandatory Appendix L explains the technique by which these acceptance criteria were determined.
Polymers and Elastomers (Part PM)

- Single-Use Components & Assemblies
- Multi-use components
- Elastomer Performance
- Hose Assemblies
- Navigation Ease
Surface Finishes (Part SF)

- Complete renumbering of Part and Non-Mandatory Appendix D, E, and H
- Address the use of Animal Derived Ingredient (ADI)
- Further separated Metal from Polymeric Materials
- Added Metric Dimension Tables
- New heading “Surface Finishes for Product Contact Surfaces”
Equipment Seals (Part SG)

- Completely reorganized
- Table of contents
- Seal performance criteria and methods of testing
- Including chemical (process) compatibility, physical requirements and compliance requirements
- Seal applications added
Design for Cleanability and Sterility (Part SD)

- Total layout change to reflect a more user-friendly content
- Figures updated
- Better illustrations
ASME BPE Branch Study 2012

- Scheduled for Q4 2012
- Commissioned, funded $50,000 study by ASME
- Science-based L/D requirements
- Will provide quantified metrics for branch installations (formerly known as “dead legs”)

<table>
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<th>Dead End Length (L/D)</th>
<th>Flow Rate (m/s)</th>
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</tr>
<tr>
<td>Cleanable</td>
<td></td>
</tr>
<tr>
<td>L/D has no significant effect</td>
<td></td>
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<tr>
<td>L/D has significant effect</td>
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</tr>
<tr>
<td>Un-cleanable</td>
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Model residue: BSA+glycerol
Pipe size: 10A to 1.5S
What are the current trends and needs in the BioPharm industry?

How is the ASME BPE evolving to meet these needs?
Case/Trend #1
Multi-Product, Contract Manufacturing Facilities

Licensed CMO has to be accepted by:

– Several operating companies
– Several regulatory agencies from around the globe.
– International Standards are CRITICAL to address this trend
Case/Trend #2
Better yields – Higher titers than ever before

- Upstream smaller
- Downstream bottleneck
- Lean manufacturing
- Green manufacturing
  - Better use of current designs and materials
  - Increased penetration of single use systems
Case/Trend #3
Demand for better performing Materials (ie: Alloys, Thermoplastics, Elastomers)

- 2-5 year lifespan
- Resistance and compatibility with steam and corrosives
- *Consistent (Repeatable) Material Performance is CRITICAL*
- Expectation that fittings, tubing, valves and components comply with TRACEABLE INTERNATIONAL STANDARDS
Internationally accepted “Acceptance Criteria” is required for all 3 cases/trends.

- Science (fact) Based Requirements
- Not restrictive or expensive
- Consideration for the 5-10 year old system – Not just the “new system” (they are only new for a short time)
- Updated regularly to reflect the current acceptance criteria
How do I get involved in the ASME BPE?

- Go to a meeting and listen to the Subcommittee Sessions
- Determine where your technical strengths would help
- **Actively participate & contribute** to a Task Group.
- Speak up and be an active participant in the Subcommittee Sessions
Should I become a member?

• Yes!

• In order to be a member, you must confirm that;
  – You can spare the time and interest to be an active participant
  – Your company will support your ASME BPE work
  – If you want to vote on changes and updates to an international standard

You do not have to become a member to participate in ASME BPE
Thank you for your time and attention

Questions?

Tom Winter