Commissioning Codes and Standards CSA Z320, Z318, Z8001, ASHRAE 202

• By Derek Cheung, P.Eng., ACP, CBCP, CMVP
  – Isotherm Engineering Ltd.
  • Toronto, ON 13 November 2013
Intent

1. Understand the history and importance of the standards.
2. Highlights of the standards contents.
3. What the standards are not.
4. Beyond the standards.
Evolution

1. Problematic Buildings and Poor Experience
2. Best Practices and Guidelines
3. Standards
Poor Experience

- Design/Spec Phase
- (access)
Poor Experience

- Design/Construction Phase
- (Interference)
Poor Experience

- Post-Occupancy Phase
- (Training)
History

• 1982 – ASHRAE forms committee
• 1989 – ASHRAE Guideline 1
• 1996 – ASHRAE Guideline 1 revised
• 2000 – ASHRAE + NIBS to develop the Cx Process
• 2005 – ASHRAE / NIBS Guideline 0
• 2007 – ASHRAE Guideline 1 revised
• 2013 – ASHRAE Standard 202
Best Practices and Guidelines

- BCA – New Construction Building Commissioning Best Practice 2011
- California Commissioning Collaborative (CCC) – New and Existing Buildings
- Portland Energy Conservation, Inc. (PECI) – Retrocommissioning Guide
- International Code Council G4-2012 Commissioning Guideline
Best Practices and Guidelines

- ASHRAE
- Gdl 0-2005 The Cx Process
- Gdl 1.1-2007 HVAC&R Technical Requirements for The Commissioning Process
- Gdl 0.2 and 1.2 Existing Buildings – TBD
- Gdl 1.3 Training – TBD
- Gdl 1.4 Systems Manual – TBD
- Gdl 1.5 Smoke Control Systems
- Gdl 11 Field Testing of HVAC Controls Components
Standards

• Standards are minimum requirements
• Code language
• Adopted by
  • User in individual projects
  • The code
• References and Suggestions Placed in Annexes
Standards

• CSA Z320-11 Building Cx Std and Check Sheets
• CSA Z318.0-05 Cx of Health Care Facilities and SmartCD
• CSA Z8001-13 Cx of Health Care Facilities (Check Sheets)
• ASHRAE Std 202 – 2013 Commissioning Process for Buildings and Systems
CSA Z320-11 Building Cx

• Chapters:
  1. Scope
  2. Reference Publications
  3. Definitions
  4. Cx Process
    • Cx Process – phases
    • Final Documentation
    • Responsibilities
    • Training and Education
    • Dwg, Manuals, etc
CSA Z320-11 Building Cx

- Chapters:
  5. Specific Systems
    - Architectural
    - Vertical/Horizontal Transportation
    - Electrical
    - Mechanical
    - Control Systems and Integration Interface
CSA Z320-11 Building Cx

- Check Sheet types
  - Static Verification
  - Start-Up
  - Functional Performance Testing
CSA Z318.0-05 Cx HCF

- Chapters:
  1. Scope
  2. Reference Publications
  3. Definitions
  4. Cx HCF
     - Cx Plan
     - Documentation
     - Cx Process – phases
     - Responsibilities
     - Training and Education
CSA Z318.0-05 Cx HCF

- Chapters:
  5. Specific Systems
    - Plumbing
    - HVAC
    - Fire Protection
    - Control
    - Electrical
    - Communication
CSA Z318.0-05 Cx HCF

- Check Sheets (VP / CSP / PE) from SmartCD for:
  - HVAC
  - Plumbing
  - Fire Protection
  - Building Automation
  - Electrical

• VP: Verification Program; CSP: Contractor Startup Program;
• PE: Performance Evaluation
CSA Z8001 Cx HCF

- New Z8000 series standards.
- Started around 2000’s to have a Canadian standard for the design of HCF
- Z8000-11 Canadian Health Care Facilities
- Z8001-13 Commissioning of Health Care Facilities
- Z8002-14? O&M of Health Care Facilities
- Replaces CSA Z317 and Z318
- More detailed than predecessor
CSA Z8001-13 Cx HCF

• Chapters:
  0. Introduction
  1. Scope
  2. Reference Publications
  3. Definitions
  4. Cx Process
     • Cx Plan
     • Documentation, Additional Cx Documentation
     • Cx Process – phases, RCx, monitoring-based Cx
     • Responsibilities
     • Training and Education
CSA Z8001-13 Cx HCF

- Chapters:
  5. Specific Systems
    - Architectural
    - Vertical/Horizontal Transportation
    - Electrical
    - Mechanical (Plumbing, HVAC/R, Sprinkler, Others)
    - Control Systems and Integration Interface (BAS, IT)
CSA Z8001-13 Cx HCF

- 15 Annex (Informative):
  A. General Guidelines
  B. Architectural
  C. Vertical and Horizontal Transportation
  D. Electrical
  E. Mechanical
  F. Control
  G. RCx, RtCx, Ongoing Cx
  H. CSA Z320 and Z8001 Electronic Check Sheets info
CSA Z8001-13 Cx HCF

- 15 Annex (Informative):
  I. Cx of UFAD
  J. Cx of Operating Rooms, Airborne Isolation Rooms, and Post-Anaesthetic Recovery Units (OR, AIR, PACU)
  K. Cx of Special Service Areas
  L. Example of Owner’s Project Requirements
  M. Draft Overview of Basis of Design
  N. Preface and committee lists from Z320
  O. Bibliography
ASHRAE Standard 202

- Commissioning Process for Buildings and Systems
- Based on Gdl 0-2005, The Cx Process
- Underwent 2 Public Reviews
- Release Date September 2013
ASHRAE Standard 202

• General process

• 17 Chapters

• 13 Functional steps and Deliverables

• 15 Informative Annexes
ASHRAE Standard 202

• Chapters:
  1. Purpose
  2. Scope
  3. Definitions
  4. Utilization
  5. Initiating the Cx Process
  6. Owner’s Project Requirements
  7. Commissioning Plan
ASHRAE Standard 202

- Chapters:
  8. Basis of Design
  9. Contractor/Supplier/Mfr Cx Req’t
  10. Design Review
  11. Commissioning Submittal Review
  12. Construction Observation and Testing
  13. Issues and Resolution Document’n
ASHRAE Standard 202

- Chapters:
  15. Training
  16. Post Occupancy Operation
  17. Commissioning Report
ASHRAE Standard 202

- Informative Appendix:
  A. Cx Process Doc Matrix
  B. Quality Based Sampling Process
  C. Initiating the Cx Process
  D. OPR
  E. Cx Plan
  F. BOD
  G. Cx Spec
  H. Design Review and Report
  I. Submittal Review and Report
ASHRAE Standard 202

- Informative Appendix:
  J. Construction Observation and Testing Checklists and Reports
  K. Issues and Resolution Log
  L. Systems Manual
  M. Training Plans and Records
  N. End of Warranty Commissioning
  O. Cx Report
  P. Cx Resources
  Q. References
ASHRAE Standard 202

• Highlights:
  • Code language
  • Design Review types – Peer, Constructability, Code/Regulatory, Commissioning
  • Verification vs Evaluation
  • Performance Test (Component and System Based)
  • List of functional steps vs phases
  • Informative Appendices
Comparison – CSA Stds

• No OPR specifically (except Z8001)

• Z318 uses Design Intent Manual, Z8001 uses BOD

• Maintenance and data manual – A detailed document that provides the operating and maintenance requirements and associated data for the safe and efficient operation of specific pieces of equipment and systems.

• Systems operation manual (operations manual, systems manual) – A document that describes, in lay terms, the operation of all systems and equipment in a facility. An operations manual details modes of operation and includes associated diagrams that illustrate the sequence of operation for each system and interaction between individual systems.

• Extremely detailed Informative Annexes with Z8001
Comparison – ASHRAE 202

• OPR

• BOD

• Facility Guide — A basic building systems description and operating plan with general procedures and confirmed facility operating conditions, set points, schedules, and operating procedures for use by facility operations to properly operate the facility.

• Systems Manual — A system-focused composite document that includes the design and construction documentation, facility guide and operation manual, maintenance information, training information, commissioning process records, and additional information of use to the Owner during occupancy and operations.

• Extremely detailed Informative Appendices
Other Notable Guidelines

• NFPA 3 – 2012 Recommended Practice for Commissioning and Integrated Testing of Fire Protection and Life Safety Systems

• NIBS GL3-2012 Building Enclosure Commissioning Process BECx
Other Notable Guidelines

- ASHRAE GdI 4-2008 Preparation of Operating and Maintenance Documentation for Building Systems

- ASHRAE GdI 32-20012 Sustainable, High-Performance Operations and Maintenance
Other Notable Guidelines

• NIBS Total Building Commissioning
• Guideline (in various releases and drafts):
  1. ASHRAE – HVAC&R
  2. ASCE – Structural
  3. BETEC – Building Envelope
  4. NRCA – Roofing
  5. AWCI – Interior
  6. NEII – Elevator
  7. ASPE – Plumbing
  8. IES – Lighting
  9. IEEE – Electrical
  10. NFPA – Fire Protection
  11. TIA - Telecommunications
Now What?

- Commissioning IS but IS NOT:
  - Completing manufacturer’s test forms
  - Contractor’s QC check
  - Deficiency inspection
  - Construction management
The Cx Key

• Additional catalysts for success:
  • Everybody is in the Cx Team
  • CxA Experience, insight and qualification
  • Applicable codes and specific guidelines
  • Planning and Foreseeing test scenario
  • Good project management and scheduling
  • Attitude
Acknowledgement

• Gerald J. Kettler PE, CCxA, CIAQM

• William J. McCartney, CPMP, CCP
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– Isotherm Engineering Ltd.

d.cheung@isothermengineering.com