



U.S. Department of Energy
Energy Efficiency and Renewable Energy

Building Commissioning

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Four Seasons



Presentation Overview

- Commissioning Overview
- Systems Commissioned
- Commissioning Agent Core Qualifications
- Field Technician Skill Sets
- Example Commissioning Checklists
- Commissioning - Problem and Resolution Examples
- Customer Benefits of Commissioning
- Relationships – Customer / CM / Subs / Engineer
- Example of Deliverables to the Customer



Commissioning Overview

Design Review

Review specifications and documentation for commissioning, balancing and testing, maintenance and operation and design intent.

Field Installation Verification (FIV)

Coordinate, witness, verify and report on applicable FIV check sheets, the installation of all equipment, systems and subsystems to determine their installation to plans and specifications. Inspections should verify:

Operational Performance Testing (OPT)

Coordinate, witness and report on applicable OPT check sheets, the operational performance of all equipment, systems and subsystems. Tests should verify:

Functional Performance Testing (FPT)

Coordinate, witness, verify and report on applicable FPT check sheets, the functional performance of all equipment, systems and subsystem. Tests should verify:



Commissioning Overview

Operator Instruction

Prepare a training agenda. Conduct training, including instruction during equipment installation and start up; training using contract documents; “factory specialist” presentations; and hands-on training during or following functional performance testing (where required). Videotape training, where possible, for future training assistance.

Commissioning Report

Submit commissioning report and all required documentation, including systems commissioning plan, field installation verification check sheets, operation performance check sheets, functional performance test check sheets, as-built drawings, updated documents and specifications, equipment instructions, and operation and maintenance manuals. Report will include uncorrected (or uncorrectable) variations from design/specification.

Post-Commissioning Report

Perform commissioning for systems that require off-season functional performance testing. Review overall operation and performance of the system to original commissioning performance records. Issue post-commissioning report reflecting findings and recommendations.



Possible Systems Commissioned

- HVAC Systems
- Electrical Systems, General
- Electrical System, Emergency Power
- Building Envelop and Structural
- Roof Structure
- Roof Insulation
- Energy Management
- DDC Controls
- Technology Package
- Lighting
- Security Systems
- Fire /Life Safety



Commissioning Agent Core Qualifications

- HVAC
- DDC
- Energy Mgmt
- Electrical
- Plumbing
- Fire



Field Technician Skill Sets

Ideal Field Technician Skill Sets Include:

- Proficiency in DDC Controls – I.E. Programming and Troubleshooting
- 10 years plus experience in commercial HVAC applications
- Operation of Chillers, Pumps & DX Controls
- Operations and Boilers and High Temp Hot Water
- Proven Success of Energy Management Solutions Through BAC Systems
- Fire Alarm Certifications
- Quality Representative Able to Work With Customer Owner to Produce Results



Example Commissioning Checklists

**COMMISSIONING CHECK SHEET
SCREW CHILLER
OPERATIONAL PERFORMANCE TEST (OPT)**

Project _____ Test Date _____
 Equipment Tag _____ Location _____
 System _____ Dwg. No. _____

Description	Design Data	Verification
Phase II Start Up (OPT)		
Chiller Barrel		
Check Chilled Water Flow		
Verify DP Drop		
Condenser Barrel		
Check Condenser Water Flow		
Verify DP Drop		
Compressors		
Vibration Isolational Functional		
Crank Case Heater Operational		
Voltage		
Phase		
Jog for Rotation		
Amps		
Verify Overload Size and Setting		
Verify Oil Setting HP/LP		



Problem and Resolution Examples

- Proprietary Control Solutions
- Pump Seals
- Control Calibration
- Control Sequence Deficiencies
- Slag in CW / HW Loop
- Boiler Tube Rust
- Bypass Valves
- Freeze Stats
- Side Stream Filters
- Outside Air Mix

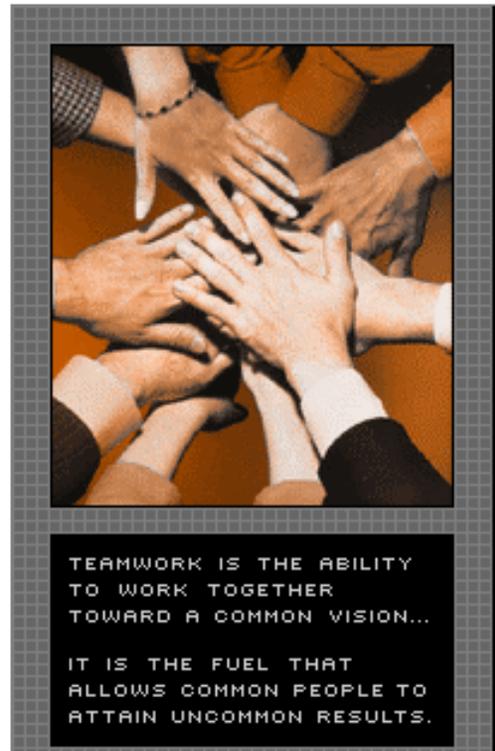


Customer Benefits of Commissioning

- Energy Management
- Training
- Deficiencies Identified
- Efficient Building



Relationships – Customer / CM / Engineer





Deliverables to the Customer

- Reporting
- Meetings / Presentations
- Punch Work
- Energy Management Solutions
- Training