BUILDING COMMISSIONING PROFESSIONAL

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Acceptance

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Acceptance is a formal action to declare that some aspect of the project meets defined requirements, thus permitting subsequent activities to proceed.

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Automated Fault Detection

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A technology that monitors components, equipment, and/or systems and recognizes when they are failing, have failed, or when environmental conditions have drifted outside the optimal capability range. The technology may potentially optimize operation and/or notify personnel, possibly ensuring timely identification and correction of operating and servic issues

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Back-Check

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A back-check is a verification that an agreed-upon solution to a design comment has been adequately addressed in a subsequent design review.

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Basis of Design (BOD)

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A document that records concepts, calculations, decisions, and product selections used to meet the owner's project requirements and satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process. Also known as the design criteria.

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Benchmarks

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Benchmarks are the comparison of a building's energy usage to other similar buildings and to the building itself. Developing standards and goals for energy management is a good way to motivate people to improve towards the goal of optimal energy performance. For example, ENERGY STAR Portfolio Manager is a frequently used and nationally recognized building energy benchmarking tool.

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Building program

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A document prepared by the owner or architect that describes the facility's space and function requirements.

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Commissioning Provider (CxP)

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An entity identified by the owner who plans, schedules, and coordinates the commissioning team to implement the commissioning process.

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Commissioning Plan

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A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

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Commissioning Record

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All formal CX documentation other than meeting minutes and communications is provided to the owner in a granular electronic folder, file, and bookmark structure.

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Commissioning Process

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A quality-focused process for enhancing the delivery of a project that includes verifying and documenting that the facility and its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the owner's project requirements.

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Commissioning Report

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A document recording the activities and results of the commissioning process Usually developed from the final commissioning plan with all of its attached appendices.

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Commissioning Review

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The commissioning review is a collaborative review of the design professionals design documents for items pertaining to the following: owner's project requirements; basis of design; operability and maintainability (O&M) including documentation; functionality; training; energy efficiency; control systems' sequence of operations, including building automation system features; commissioning specifications; and the ability to functionally test the systems. This review is not a holistic "peer" review.

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Commissioning Specifications

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The contract document that details the objective, scope, and implementation of the commissioning process as developed in the Commissioning Plan

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Commissioning Team

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A team comprised of the CxP, owner, A/E, construction manager/general contractor, contractors, maintenance and operations personnel, and occupants Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action.

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Construction Checklists

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Acceptance is a formal action to declare that some aspect of the project meets defined requirements, thus permitting subsequent activities to proceed.

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Automated Fault Detection

©Beyond Smart Cities Private Limited

a list of items that verify that equipment is on-site, ready for installation, correctly installed, set up, calibrated, functional, and ready for formal functional testing.

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Contract Documents

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The documents binding on parties involved in the construction of this project (drawings, specifications, change orders, amendments, contracts, CX Plan, etc.)

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Contractor

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The general contractor's or subcontractor's authorized representative

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Construction Documents

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Construction documents include all building plans, specifications, general conditions of the contract, and supporting documents (such as change orders and submittals) used for the completion of a construction project.

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Construction Manager (CM)

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The owner's representative managing the construction project Often, the construction manager and the general contractor are the same entity.

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Construction Team

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A team comprised of the construction manager, general contractor, subcontractors, and equipment vendors and suppliers

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Data Logging

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The monitoring and recording of temperature, flow, current, status, pressure, etc. of equipment using stand-alone' data recorders

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Deferred Functional Testing

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Tests that are performed after substantial completion due to ambient load or occupancy conditions, not allowing a thorough test during the initial testing period.

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Design Team

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The professionals (architects, engineers, and consultants) responsible for developing the project's design concepts, interim and final drawings, specifications, and basis of design.

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Functional Test

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The testing of the dynamic function and operation of components, equipment, and systems using manual (direct observation) and monitoring (data logging and trending) methods.

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Functional Test Procedure

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A written protocol that defines methods, steps, personnel, and acceptance criteria for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.

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Issues Log

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A formal and ongoing record of problems or issues—and their resolution—that have been raised by members of the commissioning team during the course of the commissioning process.

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Lessons Learned Workshop

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A workshop conducted to discuss and document project successes and identify opportunities for improvement for future projects

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Manual Test

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Testing using hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the 'observation').

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Monitoring

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The recording of parameters (temperature, flow, current, status, pressure, etc.) of equipment operation using data loggers or the trending capabilities of control systems.

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Nominal Group Technique

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A formal, structured brainstorming process used to obtain the maximum possible ranked input from a variety of viewpoints in a short period of time. The typical approach is a workshop session where a question is presented, the attendees record their responses individually on a piece of paper, the individual responses are recorded on a flip chart without discussion in a round robin fashion, all of the responses are discussed, and then the participants rank their top five responses.

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Ongoing Commissioning

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The application of commissioning-related process activities on an ongoing basis to ensure that operations are being met to support the ongoing improvement of system performance The Ongoing Commissioning Plan details how these activities and goals will be achieved.

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Owner's Representative or Project Manager (Owner)

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The contracting and managing authority for the owner who oversees the design and/or construction of the project.

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Peer Review:

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A formal, in-depth review separate from the commissioning review processes. The level of effort and intensity is much greater than a typical commissioning facilitation or extended commissioning review.

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Operations and Maintenance (O&M) Manual

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O&M manuals describe key components of each system or piece of equipment and explain how they should be operated and maintained for optimum performance.

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Owner's Project Requirements (OPR)

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A written document that details the requirements of a project and the expectations of how it will function. These include project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

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Project Turnover Documentation (by Contractor)

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OPR, BOD, record documents (plans and specs), approved submittals, including controls and balancing, change orders,O&M manuals, preventive maintenance procedures linked electronically directly from the O&M table of contents, warranties, and training materials Provided to the owner in a granular electronic folder, file, and bookmark structure.

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Sampling

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Performing observation, review, testing, or other verification on only a fraction of the total number of identical or near identical pieces of equipment, drawings, events, etc. Sampling techniques include random statistical sampling and less formal professional judgment methods.

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Systems Manual:

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A compilation used by other Cx Guidelines (such as ASHRAE and USGBC) that includes the Systems Operations Guide, the Cx Record, and the Contractor's Project Turnover Documentation referred to in the Best Practices.

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Systems Operations Guide

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Salient information for operating the facility that is not found in the O&M manuals, including such things as the BOD (if current; otherwise, include short updated design narratives), system single-line flow diagrams, space environmental requirements, final set points, diagnostic tools, trends and report instructions, recalibration and OCx guidelines, and emergency and maintenance shutdown and restart procedures. The guide is provided by the CxP in a granular electronic folder, file, and bookmark structure.

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Trending

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Monitoring over a period of time with the building automation system

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Verification

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The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the owner's project requirements or other project documents.

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Warranty Period

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The period of time in which the contractor is responsible for equipment repairs following turnover to the owner. The warranty period is defined in the construction contract.

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Building Management System, Building Automation System:

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Hardware and software that provide building systems control and data management as typically applied to HVAC systems but can be integrated and/or programmed for lighting, security, and other systems control and monitoring.

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Commissioning

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A quality-focused process for enhancing the delivery of a project The process focuses on verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the owner's project requirements (OPR). Followed in EBCx by Current Facility Requirements (CFR).

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Commissioning Provider

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A firm or individual who, through coordinated actions, is responsible for implementing the CX Process. Best practice recommendation: Third-party commissioning providers are commissioning consultants hired directly by the building owner and are not responsible for or affiliated with any other member of the design and construction teams.

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Commissioning Team

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The key members of each party involved with the project are designated to provide insight and carry out tasks necessary for a successful commissioning project. Team members may include the commissioning lead, the building owner or owner's representative, building staff, design professionals, contractors or manufacturer's representatives, testing specialists, and the rating system coordinator. The team may also consist of a group of commissioning system specialists in such areas as building enclosure, lighting controls, fire protection, and more.

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Current Facility Requirements:

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A written document that describes the current functional requirements of a facility and the expectations of how it should be used and operated This may include goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information to meet the requirements of occupants, users, and the owner(s) of the facility.

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Diagnostic Plan

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A plan that describes the methods, frequency, and application of evaluating system performance through the collection and analysis of building system data.

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Existing Building Commissioning

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A quality-focused process for attaining the CFR of an existing building and/or its systems and assemblies The process focuses on planning, investigating, implementing, verifying, and documenting that the facility and/or its systems and assemblies are operated and maintained to meet the CFR, with a program in place to maintain the enhancements for the remaining life of the facility.

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Energy Information System (EIS)

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The software, data acquisition hardware, and communication systems used to store, analyze, and display building energy data An EIS often includes analysis methods such as baselining, benchmarking, utility and carbon tracking, load profiling, and energy anomaly detection. Energy Information Systems are a subset of EMIS focused on meter-level monitoring (hourly or more frequent), sometimes also called enterprise energy management systems.

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Energy Management and Information System (EMIS)

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Energy Management and Information Systems (EMIS) comprise a broad family of tools and services to manage commercial building energy use. These technologies offer a mix of capabilities to store, analyze, and display energy use and system data, and in some cases, provide control. EMIS is an umbrella term that covers both meter-level and system-level EMIS. Used to manage facility energy information and data, including the baseline, benchmark, and ongoing tracking of utility bills, utility meters, and related submeter data. The system may also be integrated with the BMS or BAS for system-specific data management and performance evaluation.

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Facility Guide

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The Facility Guide referred to in this OCx Best Practices document, and what is sometimes referred to as a Systems Manual in the industry, is what ASHRAE defines as "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."

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Fault Detection and Diagnostics (FDD)

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alarm or notification of a system abnormality Typically programmed into BAS/BMS or other monitoring software for operator awareness of system faults and issues. FDD automates the process of detecting faults in physical systems and processes and diagnosing their potential causes. FDD systems for HVAC generally use a database of "expert rules" that analyzes BAS and meter data to determine fault conditions. FDD is a subset of EMIS focused on system-level monitoring (using BAS data).

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Facility Improvement Measures

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Alterations or revisions to systems or equipment planned to improve building and system performance, reduce operations and maintenance (O&M) costs, and/or improve indoor environmental quality as part of an EBCx or OCx process

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Functional Performance Test Protocol

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A written collection of tests that, when executed in the test process, allow verification of the performance of a system or assembly. See Diagnostic Plan

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Master List of Findings

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A summary list of findings generated during the investigation process For each finding, the list contains fields such as: finding description, type of equipment, recommended improvement, estimated energy savings and costs, simple payback, recommendations, and status of implementation. Also known as the Findings Log.

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Measurement and verification

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methods for gathering relevant data over time to evaluate performance and benefits Often related to performance contracting, where performance measurement is needed for validation of project financial savings and operating performance requirements.

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Monitoring-Based Commissioning

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A process to improve the operation of buildings with an emphasis on using meter-level or system-level data analysis to identify opportunities for improvements (analysis approaches may be embedded in EMIS software). The MBCx process includes initially bringing the building systems up to the owner's operating requirements through an existing building commissioning process, then performing ongoing commissioning to identify and correct degraded performance over time. Alternatively, EMIS tools can be utilized during the EBCx process to support issue identification.

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New Construction Commissioning

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A quality-focused process for verification of the owner's project requirements (OPR) and turnover of new construction to stable operations The process includes validation of project performance through design review, construction review, functional testing, training, and turnover to operations.

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Ongoing Commissioning

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The means and process to optimize and sustain building performance on an ongoing basis through investigation, analysis, and monitoring the performance of building systems As a continuation of the Cx process typically implemented following NCCx or EBCx, OCx verifies that a facility continues to meet current and evolving CFR (OPR for new construction). OCx Process Activities occur throughout the life of the facility; some of these will be close to continuous in implementation, and others will be either scheduled or unscheduled (as needed).

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OCx Plan

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A document that outlines the organization, goals, schedule, allocation of resources, and documentation requirements of the OCx Process. Includes a program management plan, a change management plan, a diagnostic plan, and relevant process and facility operating documents.

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Training Plan

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A written document that details the expectations, schedule, budget, and deliverables of Cx Process Activities related to the training of project team members, including facility managers, O&M personnel, users, and occupants.
Test Procedure A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems

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Verification

©Beyond Smart Cities Private Limited

The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the CFR.

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Commissioning (Cx)

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A quality-focused process for enhancing the delivery of a project The process focuses on verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the owner's project requirements (OPR). Followed in EBCx by Current Facility Requirements (CFR).

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Commissioning (Cx) Provider Firm or Individual

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who, through coordinated actions, is responsible for implementing the Cx Process. Third-party commissioning providers are commissioning consultants hired directly by the building owner and not responsible for or affiliated with any other member of the design and construction team.

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Commissioning Team

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The key members of each party involved with the project are designated to provide insight and carry out tasks necessary for a successful commissioning project. Team members may include the commissioning lead, the building owner or owner's representative, building staff, design professionals, contractors or manufacturer's representatives, testing specialists, and the rating system coordinator. The team may also consist of a group of commissioning system specialists in such areas as building enclosure, lighting controls, fire protection, and more.

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Current Facility Requirements

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A written document that describes the current functional requirements of a facility and the expectations of how it should be used and operated This may include goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information to meet the requirements of occupants, users, and the owner(s) of the facility.

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Existing Building Commissioning (EBCx)

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A quality-focused process for attaining the CFR of an existing building and/or its systems and assemblies
The process focuses on planning, investigating, implementing, verifying, and documenting that the facility and/or its systems and assemblies are operated and maintained to meet the CFR, with a program in place to maintain the enhancements for the remaining life of the facility.

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EBCx Commissioning Plan Functional Performance Test Protocol

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A document that outlines the organization, goals, schedule, allocation of resources, and documentation requirements of the Cx Process

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Facility Guide

©Beyond Smart Cities Private Limited

A basic building systems description and operating plan with general procedures and confirmed facility operating conditions, setpoints, schedules, and operating procedures to properly operate the facility

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Functional Performance Test Protocol

©Beyond Smart Cities Private Limited

A written collection of tests that, when executed in the test process, allow verification of the performance of a system or assembly.

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Master List of Findings

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A summary list of findings generated during the investigation process For each finding, the list contains fields such as: finding description, type of equipment, recommended improvement, estimated energy savings and costs, simple payback, recommendations, and status of implementation. Also known as the Findings Log.

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Measurement and Verification (M&V) Plan

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A plan for gathering relevant data over time to evaluate performance and benefits

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Ongoing Commissioning (OCx) Process

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A continuation of the Cx Process after the Hand-Off Phase to verify that a facility continues to meet current and evolving CFR (OPR for new construction). OCx Process Activities occur throughout the life of the facility; some of these will be close to continuous in implementation, and others will be either scheduled or unscheduled (as needed).

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Sequence of Operations:

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A narrative describing how the mechanical, electrical, energy management, and control systems are intended to operate during start-up and other modes of operation

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Test Procedure

©Beyond Smart Cities Private Limited

A written protocol that defines methods, personnel, and expectations for tests conducted on components, equipment, assemblies, systems, and interfaces among systems.

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Automated Fault Detection

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Acceptance is a formal action to declare that some aspect of the project meets defined requirements, thus permitting subsequent activities to proceed.

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Training Plan

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A written document that details, ideally, the expectations, schedule, budget, and deliverables of Cx Process Activities related to training of project operations and maintenance personnel, users, and occupants.
Verification The process by which specific documents, components, equipment, assemblies, systems, and interfaces among systems are confirmed to comply with the criteria described in the CFR

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Basis of Design (BOD)

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The documentation by the design team of the primary thought processes and assumptions behind design decisions that are made to meet the Owner's Project Requirements. The BOD describes the assumptions used for sizing and selection of systems (i.e. codes, standards, operating conditions, design conditions, weather data, interior environmental criteria, other pertinent design assumptions, etc.).

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Building Assessment Tool (BAT

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The purpose of the BAT system is to help PBS estimate the total future costs for repairing and maintaining each building in order to facilitate development of an appropriate asset strategy. The BAT system will be used to manage the data for two types of surveys, BAT (previously called PCS) and BER (aka WebBER).

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Building Enclosure Commissioning (BECx)

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ASTM E2947: architecture or engineering-related technical services or both, performed on behalf of the Owner that implements a quality-focused process for enhancing the delivery of a project by focusing on validating during the design phase and verifying during the construction phase that the performance of building enclosure materials, components, assemblies and systems are designed and installed to meet the Owner's Project Requirements

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Building Enclosure Commissioning Plan (BECx plan)

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ASTM E2947: a document that outlines the scope, organization, schedule, allocation of resources, responsibilities, testing and documentation requirements of the building enclosure commissioning process to meet the OPR. The BECx plan may be a portion of the whole building Cx plan.

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Building Enclosure Commissioning Provider (BECxP)

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ASTM E2947- a duly authorized person or firm in the jurisdiction of the project retained by the Owner to develop, manage, and be in responsible charge of the BECx process.

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Commissioning Process (Cx)

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ASHRAE Standard 202-2018: a quality-focused process for enhancing the delivery of a project. The process focuses on verifying and documenting that all of the commissioned systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the OPR.

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Cx testing

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the evaluation and documentation of the equipment and assemblies, delivery and condition, installation, proper function according to the manufacturer's specifications, and project documentation to meet the criteria in the OPR.

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Commissioning Record

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The complete set of commissioning documentation for the project which is turned over to GSA at the end of the construction phase.

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Construction Checklist

©Beyond Smart Cities Private Limited

A checklist to ensure that the specified equipment has been provided, is properly installed and initially started and checked out adequately in preparation for full operation and functional testing.

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Functional Tests:

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Tests that evaluate the dynamic function and operation of equipment and systems using direct observation or other monitoring methods. Functional testing is the assessment of the system's (rather than just component's) ability to perform within the parameters set up within the Owner's Project Requirements and Basis of Design. Functional tests are performed after construction checklists are complete.

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Indoor Environmental Quality (IEQ)

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The artificial environment that exists in a building that includes the factors of thermal comfort, illumination, noise, ventilation and level of indoor air pollutants.

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Issues Log

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A formal and ongoing record of problems or concerns, as well as associated priorities, implications and resolutions.

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Management Analysis Review System (MARS) Review:

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A tool for the GSA managers to monitor, assess and improve regional property management operations. A self-audit, conducted every two years, in response to the Office of Management and Budget Circular A-123. The review checklists focuses on: Administrative, Childcare, Concessions, Custodial, Security, Energy, Occupancy Administration, Lease Management, Maintenance, Measures, Procurement, Repair and Alteration, Fire Protection and Life Safety Program Management, and Environmental, Health and Safety (EH&S).

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Owner's Project Requirements

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The documentation that provides the Owner's vision for the planned facility, functional performance requirements and expectations for how it will be used and operated. It also provides benchmarks and criteria for performance.

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Recommissioning

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The process of commissioning a facility beyond the construction, occupancy and warranty phases. The purpose of recommissioning is to assure the facility performs as expected over its useful life.

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