

QUESTIONNAIRE REPORT SHEET

iPQCxA.V1.1

iPQ.No	Correct Answer	Points	Explanation
CxA001	4	0.84	Answer = 4 All of the above
CxA002	4	0.84	Answer = 4 All of the above
CxA003	3	0.84	Answer = 3 Both
CxA004	1	0.84	Answer = 1 The overall cost of construction HVAC commissioning is approximately 80% of that for comprehensive commissioning because commissioning work is concentrated in the construction and acceptance phases.
CxA005	3	0.84	Answer = 3 Both <ul style="list-style-type: none"> It is important to involve the independent commissioning authority as early in the project as possible. This allows the provider the opportunity to review the design intent for the project, begin scheduling commissioning activities, and begin writing specifications into bid documents for other contractors.
CxA006	1	0.84	Answer = 1 True The commissioning authority works directly for the owner and is independent of designers, contractors, vendors and suppliers on the project.
CxA007	4	0.84	Answer = 4 All of the above
CxA008	1	0.84	Answer = 1 Equipment operation during FPT's is performed by the appropriate contractor or equipment manufacturer, but the responsibility for directing, witnessing, and documenting the tests rests with the commissioning authority.
CxA009	3	0.84	Answer = 3 Both

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CxA010	3	0.84	<p>Answer = 2</p> <p>Both</p> <ul style="list-style-type: none"> Along with the proposed scope of work, an experienced commissioning authority will be able to provide a preliminary commissioning services budget. The commissioning authority provides a fixed cost for the pre-design and design phase involvement, and an adjustable, estimated not-to-exceed cost for the remaining phases.
CxA011	1	0.84	<p>Answer = 1</p> <p>2% and 5%</p> <p>Experience indicates that the overall cost of comprehensive HVAC commissioning is usually between 2% and 5% of the HVAC construction cost.</p>
CxA012	1	0.84	<p>Answer = 1</p> <p>Functional performance tests identify problems that a physical inspection cannot detect.</p>
CxA013	2	0.84	<p>Answer = 2</p> <p>Architect / Engineering</p> <p>The designer is responsible for the design intent document (DID), which defines the technical design criteria required to satisfy the building's intended use and occupancy needs.</p>
CxA014	4	0.84	<p>Answer = 4</p> <p>All of the above</p>
CxA015	1	0.84	<p>Answer = 1</p> <p>System Manuals</p>
CxA016	2	0.84	<p>Answer = 2</p> <p>False</p> <p>The pre-design commissioning outline is prepared by the commissioning authority.</p>
CxA017	4	0.84	<p>Answer = 4</p> <p>All of the above</p>
CxA018	3	0.84	<p>Answer = 3</p> <p>Both</p> <p>The owner and his design consultants review the commissioning outline.</p>
CxA019	4	0.84	<p>Answer = 4</p> <p>All of the above</p>
CxA020	3	0.84	<p>Answer = 3</p> <p>Both</p> <ul style="list-style-type: none"> The designer has sole responsibility for the specifications. The commissioning authority should review the specifications to ensure the inclusion of material describing the contractor's responsibilities related to commissioning. Comments and suggestions should be forwarded to the designer for consideration.
CxA021	3	0.84	<p>Answer = 3</p> <p>Both</p>

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CxA022	4	0.84	Answer = 4 All of the above
CxA023	1	0.84	Answer = 1 True The criteria for completion of the commissioning process will typically include verification of functional performance for all systems, and submission of TAB reports and O&M manuals.
CxA024	4	0.84	Answer = 4 All of the above <ul style="list-style-type: none"> • The sequence and timing of commissioning activities must be incorporated into the overall project schedule. • The commissioning authority identifies the required commissioning activities. • Coordination requires input from the owner, designer, and contractors. Cooperation among the parties facilitates integration of commissioning into the total construction program.
CxA025	3	0.84	Answer = 3 Design team and commissioning authority Before executing their work, the TAB agency submits to the design team and commissioning authority a report detailing the TAB procedures and instruments planned for use on the project.
CxA026	2	0.84	Answer = 2 False The contractor is responsible for the overall construction process, but the commissioning authority maintains an issues tracking system to help keep the process on schedule.
CxA027	1	0.84	Answer = 1 Section 01810 – General Commissioning Requirements
CxA028	2	0.84	Answer = 2 Designers and contractors The commissioning authority obtains and reviews HVAC submittal data, including complete HVAC control submittals, and consults with the designers and contractors regarding conformance with the design intent. The designer provides final approval of all submittals.
CxA029	1	0.84	Answer = 1 Section 01814:Commissioning plumbing and piping Requirements
CxA030	1	0.84	Answer = 1 Section 01815 : Commissioning HVAC requirements
CxA031	2	0.84	Answer = 2 Section 01816 : Commissioning electrical systems requirements

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CxA032	3	0.84	<p>Answer =3</p> <p>Owner and Design team</p> <p>The owner and the design team review the updated commissioning plan.</p>
CxA033	4	0.84	<p>Answer = 4</p> <p>All off the above</p> <ul style="list-style-type: none"> Review the OCx Plan and OCx goals and objectives. Perform a technology gap analysis. Identify the technology requirements
CxA034	1	0.84	<p>Answer = 1</p> <p>Commissioning Authority</p> <p>The commissioning authority observes the installation periodically to assess construction compliance with the DID, specification requirements, and prevailing industry standards.</p>
CxA035	1	0.84	<p>Answer = 1</p> <p>Section 01810</p>
CxA036	1	0.84	<p>Answer = 1</p> <p>Owner, designer, contractors, and commissioning authority</p> <p>The owner, designer, contractors, and commissioning authority periodically review the updated project schedule to ensure that all required commission- ing activities are incorporated, time allowances are adequate, and installation sequences are logical and properly coordinated with other construction activities.</p>
CxA037	3	0.84	<p>Answer = 3</p> <p>Both</p> <ul style="list-style-type: none"> The contractor is responsible for the overall construction process, including the necessary scheduling and coordination. To keep the process on schedule, the commissioning authority will maintain an issues tracking system to ensure that issues raised during commissioning are documented, addressed, followed up, and kept visible until resolved.
CxA038	4	0.84	<p>Answer = 4</p> <p>Commissioning Provider - CxP</p> <p>The commissioning authority's on-site presence during construction provides an additional avenue for communicating design intent concerns.</p>

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CxA039	3	0.84	<p>Answer = 3</p> <p>Both</p> <p>The commissioning authority should work with the general contractor to schedule commissioning meetings in conjunction with regular progress meetings. The commissioning authority keeps meeting minutes and distributes them to all team members. RTFs are updated through input from these working sessions. deficiencies</p>
CxA040	3	0.84	<p>Answer = 3</p> <p>Design Consultant</p> <p>The designer specifies TAB procedures, and makes all final decisions regarding a system's TAB status.</p>
CxA041	1	0.84	<p>Answer = 1</p> <p>Contractors, subcontractors, and suppliers</p> <p>All contractors, subcontractors, and suppliers are responsible for supplying materials and installing work in accordance with the design documents and the project schedule.</p>
CxA042	4	0.84	<p>Answer = 4</p> <p>Contractor</p> <p>The responsibility for carrying out System Verification Checks (SVCs) checks, as well as any corrective action, lies with the contractor.</p>
CxA043	4	0.84	<p>Answer = 4</p> <p>All of the above</p> <ul style="list-style-type: none"> • The automatic temperature controls (ATC) contractor carries out point-to-point control checks and documents the results on checkout sheets. • These checks confirm that all control-point wiring has been correctly installed and terminated, sensors have been calibrated, and field devices operate correctly. • This involves the physical observation of device responses by the ATC contractor to ensure they match control system displays. • The commissioning authority verifies the results reported by the ATC contractor and includes this information in the commissioning report. • Commissioning authorities frequently employ sampling techniques to verify documents at point-to-point checkouts. Direct monitoring of the ATC checkout process facilitates conformance with the DID. •

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CxA044	1	0.84	Answer = 1 The mechanical contractor is responsible for starting HVAC equipment and systems in accordance with the specifications. Problems or incomplete work must be corrected by the responsible contractors and re-tested to produce satisfactory results.
CxA045	1	0.84	Answer = 1 Commissioning Provider - CxP The commissioning authority witnesses start-ups, and documents the results using the start-up checklists and other provisions in the commissioning plan.
CxA046	3	0.84	Answer = 3 All of the above
CxA047	1	0.84	Answer = 1 Commissioning Provider - CxP When the manufacturer's technician does the start-up, the commissioning authority notes this fact on the start-up checklist and attaches a copy of the manufacturer's start-up report.
CxA048	2	0.84	Answer = 2 Commissioning Authority
CxA049	1	0.84	Answer = 1 Mechanical contractor The mechanical contractor is responsible for preparing the O&M documentation and training program in accordance with specification requirements.
CxA050	3	0.84	Answer = 3 Both The commissioning authority, designer, owner, and O&M staff should review and revise the training programme summary to meet the facility's needs. With the help of the commissioning authority, the contractor makes detailed written or electronic O&M documents and training materials to go along with verbal presentations and demonstrations. This gives O&M personnel a permanent resource.
CxA051	1	0.84	Answer = 1 Commissioning authority, designer, owner, and O&M The commissioning authority, designer, owner, and O&M staff should review and revise the training programme summary to meet the facility's needs.

iPQ.No	Correct Answer	Points	Explanation
CxA052	4	0.84	<p>Answer = 4 All of the above</p> <ul style="list-style-type: none"> The mechanical contractor is responsible for preparing HVAC systems for functional performance tests (FPTs). The mechanical contractor, the testing contractor, and other applicable subcontractors carry out functional performance checks prior to the formal tests, using the functional performance test checklists as a guide. When trial tests show that systems are installed and work according to the contract documents and the DID, the contractor tells the commissioning authority that a system is ready for functional performance tests.
CxA053	4	0.84	<p>Answer = 4 All of the above</p> <ul style="list-style-type: none"> It is the responsibility of the contractor who installed the automatic temperature controls (ATC) to keep a record of everything pertaining to the controls installation. At a bare minimum, the following information regarding the as-built state should be included: Data on all components included with the controls installation, including general descriptions, technical and applications data, and installation, calibration, and maintenance information Schematic diagrams of the entire controls system, in the form of laminated or framed drawings, computer graphics, or other specified formats A complete points list with records of point-to-point wiring and field device tests Complete written sequences of controls for all systems, with details of final values for all parameters and set-points Clearly labelled control panels and devices per specifications For DDC systems, a complete set of system discs
CxA054	4	0.84	<p>Answer = 4 All of the above</p> <ul style="list-style-type: none"> The TAB agency completes and submits the preliminary TAB report to the designer. The designer asks for TAB report verification based on the commissioning specifications and done by the commissioning authority with help from TAB agency equipment and people. The TAB agency does work to fix any problems found during verification or in response to comments from the designer. It then sends the final TAB report back to the designer for approval.

iPQ.No	Correct Answer	Points	Explanation
CxA055	2	0.84	<p>Answer = 2</p> <p>Commissioning specification and the commissioning plan</p> <p>The commissioning specification and the commissioning plan should clearly indicate the financial responsibilities in the event of failed or aborted FPTs.</p>
CxA056	4	0.84	<p>Answer = 4</p> <p>All of the above</p> <ul style="list-style-type: none"> • According to the specification, it is the commissioning authority's job to record O&M training and demonstration sessions on video and keep a record of them. • With a videotape, O&M staff can go over training materials again, and new staff can get the same information that was given at the original sessions, including questions and answers. • Video makes training more consistent and is a key part of adding value to the HVAC commissioning process.
CxA057	4	0.84	<p>Answer = 4</p> <p>All of the above</p> <ul style="list-style-type: none"> • It may be necessary to defer some tests until outside weather conditions are more suitable for achieving useful results. • The commissioning authority works with the commissioning team to schedule tests when weather conditions are suitable. System verification checks, start-ups of equipment and systems, O&M provisions, and most FPTs should occur prior to substantial completion, leaving the weather-dependent items to be performed later. • The commissioning specification and the commissioning plan should clearly indicate the financial responsibilities in the event of failed or aborted FPTs.
CxA058	4	0.84	<p>Answer = 4</p> <p>All of the above</p> <ul style="list-style-type: none"> • The final commissioning report should contain an executive summary addressing design intent conformance for all commissioned equipment and systems. • The report should include references to all relevant HVAC system documentation, and should be organized and tabulated to facilitate access to specific information. • The owner and the design team review the final commissioning report to determine completion of the commissioning plan.

iPQ.No	Correct Answer	Points	Explanation
CxA059	3	0.84	<p>Answer = 3</p> <p>Both</p> <ul style="list-style-type: none"> • Systems that are health or safety-related will be governed by regulations or codes that mandate specific, formal test procedures, which in some cases must be carried out or witnessed by personnel certified by a regulatory agency. • If this work is included within the commissioning authority's scope of work, then the commissioning plan must include provisions to fulfil these requirements.
CxA060	4	0.84	<p>Answer = 4</p> <p>All of the above</p> <ul style="list-style-type: none"> • Information about equipment, such as models, service, air or water flows, heating or cooling capacities, motor sizes, electrical needs, and control sequences. • Test and balance work to produce data on current air and water flows • Functional performance tests to produce comprehensive data on how systems are currently operating. • ATC point-to-point checkouts and sequences of operation
CxA061	4	0.84	<p>Answer = 4</p> <p>All of the above</p>
CxA062	3	0.84	<p>Answer = 3</p> <ul style="list-style-type: none"> • Typically limited to the systems (or portions of systems) being modified or replaced. • Existing systems that interface with the new work will be included in the commissioning scope to ensure correct systems and control integration has been achieved
CxA063	4	0.84	<p>Answer = 4</p> <p>All of the above</p> <ul style="list-style-type: none"> • Balance systems, document and verify the results, if that is part of the commissioning scope • Carry out functional performance tests on all HVAC systems included in scope to confirm and verify that they meet expected requirements; document results • Review O&M staff training; provide additional training or retraining as needed and Complete commissioning report
CxA064	4	0.84	<p>Answer = 4</p> <p>All of the above</p>
CxA065	3	0.84	<p>Answer = 3</p> <p>Both</p> <ol style="list-style-type: none"> 1. Planning 2. Implementation
CxA066	1	0.84	<p>Answer = 1</p> <p>Identical to that for re-commissioning, except that it occurs when the HVAC systems in a building were not commissioned when new and are being commissioned for the first time.</p>

iPQ.No	Correct Answer	Points	Explanation
CxA067	3	0.84	<p>Answer = 3 Both</p> <ul style="list-style-type: none"> Periodically, the HVAC systems in a building that were installed when it was new are recommissioned. The purpose of re-commissioning could be to diagnose the cause of ongoing, unresolved problems or as part of a planned preventive maintenance programme that includes formal re-commissioning elements.
CxA068	4	0.84	<p>Answer = 4 All of the above</p> <ol style="list-style-type: none"> Periodic re-commissioning Retro-commissioning; HVAC system modifications
CxA069	4	0.84	<p>Answer = 4 All of the above</p> <ol style="list-style-type: none"> Eliminates the pre-design and design phase planning and preparation included in Comprehensive HVAC Commissioning. Negative impact on commissioning effectiveness, and produces very little cost savings. Contractor has little or no advance warning that Cx will occur. Commissioning authority has minimal time to plan and coordinate the commissioning process before system start-ups are scheduled.
CxA070	4	0.84	<p>Answer = 4 Owner Representative / Owner</p>
CxA071	3	0.84	<p>Answer = 3 Both</p> <ol style="list-style-type: none"> The authority leads the commissioning process and works cooperatively with the designers and contractors, always in the owner's interest. Facilitates communication and coordination among designers, contractors, and suppliers
CxA072	4	0.84	<p>Answer = 4 All of the above</p>
CxA073	4	0.84	<p>Answer = 4 All of the above</p>
CxA074	2	0.84	<p>Answer = 2 Commissioning Provider (CxP)</p>
CxA075	1	0.84	<p>Answer = 1 Specifications</p>
CxA076	4	0.84	<p>Answer = 4 All of the above</p>

iPQ.No	Correct Answer	Points	Explanation
CxA077	3	0.84	<p>Answer = 3 All of the above</p> <p>Ideally, the CxP learns how data is input into the tracking system, particularly if an owner has been using manual data entry.</p> <p>Over time, the standard metrics used for analysing the building's performance may need to be updated to adjust for utility changes, building changes, and/or code or goal changes.</p>
CxA078	3	0.84	<p>Answer = 3 Both</p> <p>During investigation planning, discuss how to define simple repairs. It is A measurement and verification (M&V) plan can be a significant and useful parallel effort to ongoing best practises.</p> <ul style="list-style-type: none"> • Upon owner request or as a programme requirement, M&V can be developed by CxP. • The CxP can write and update the M&V plan, which includes documentation and data from previous commissioning efforts and keeps track of energy use and other building metrics over time.
CxA079	3	0.84	<p>Answer = 3 Both</p> <p>Throughout the EBCx process, the CxP shall work with the owner and/or BAS service contractor to update and accurately reflect the as-programmed sequences of operations. This shall be done in two ways through the EBCx process.</p> <ul style="list-style-type: none"> • During the implementation phase, the CxP shall prepare a Facility Guide that describes the sequence of operations for the project's systems and equipment. • Additionally, as part of the implementation phase, the BAS service contractor shall prepare and submit an updated as-built controls submittal that reflects all of the actual programmed sequences of operations for the systems and equipment within the scope of the EBCx project.

iPQ.No	Correct Answer	Points	Explanation
CxA080	4	0.84	<p>Answer = 4</p> <ul style="list-style-type: none"> Trend data is analysed using spreadsheets or cloud-based software. The goal of trend monitoring is to allow for the identification of improper operation, a lack of schedule control, or other operational issues inconsistent with meeting the CFR or the system or equipment operating at optimal efficiency. Energy, nonenergy, and other system performance data establish baseline benchmarks for facility performance. As part of an ongoing commissioning programme, the way performance is measured and tracked can be improved.
CxA081	3	0.84	<p>Answer = 3</p> <p>All of the above</p> <ul style="list-style-type: none"> Early in the implementation phase, the diagnostic plan outlines the commissioning actions and tools needed to meet project monitoring and evaluation goals before data monitoring systems are set up. The Continuing CX team can set up consistent data monitoring points, frequency of data trends, alert and notification priority, infrastructure needs, and reporting methods. The Diagnostic Plan lists diagnostic tasks and required data and information. The Diagnostic Plan will describe how the Cx project team will monitor building system performance using equipment data and the BAS if an EMIS is not being implemented.
CxA082	1	0.84	<p>Answer = 1</p> <p>No conflict of interest</p>
CxA083	4	0.84	<p>Answer = 4</p> <p>All of the above</p>
CxA084	4	0.84	<p>Answer = 4</p> <p>All of the above</p>
CxA085	1	0.84	<p>Answer = 1</p> <p>Integrated Approach to Commissioning</p> <p>The Integrated Commissioning Method ensures that the right decisions are made during the early stages of the project during planning, execution of earlier design, and construction phases, to ensure that commissioning of our systems will be successful.</p>

iPQ.No	Correct Answer	Points	Explanation
CxA086	4	0.84	Answer = 4 All of the above A comprehensive M&V plan requires significant effort and should be developed in response to an Owner request or a programme requirement. The M&V plan can be written and reviewed by the CxP. It is important that the M&V plan be developed around the existing or planned data collection infrastructure as part of the EBCx Project.
CxA087	1	0.84	Answer = 1 Integrated Approach to Commissioning
CxA088	1	0.84	Answer = 1 The authority in charge of commissioning projects ought to be impartial and independent. It is imperative that any potential conflicts of interest, as well as the plans for how they will be resolved, be stated in writing.
CxA089	1	0.84	Answer = 1 Owner's Project Requirements
CxA090	1	0.84	Answer = 1 Stopped until the quality of the documents met expectations.
CxA091	1	0.84	Answer = 1 Throughout the project at scheduled and unscheduled (audit) times.
CxA092	4	0.84	Answer = 4 All of the above
CxA093	1	0.84	Answer = 1 HVAC systems
CxA094	1	0.84	Answer = 1 Quality-Based Sampling
CxA095	4	0.84	Answer = 4 Commissioning Provider
CxA096	2	0.84	Answer = 2 Nominal Group Technique
CxA097	1	0.84	Answer = 1 The Commissioning Process Progress Report is revised throughout the Commissioning Process for the facility and is often added as a continuing appendix to the Commissioning Plan.
CxA098	1	0.84	Answer = 1 Support/manage BAS system requirements for data collection and management per the OCx Plan
CxA099	3	0.84	Answer = 3 Both Inform the condition- assessment effort Identify key opportunities for OCx

iPQ.No	Correct Answer	Points	Explanation
CxA100	3	0.84	Answer = 3 Both <ul style="list-style-type: none"> Review design and validate implementation of technology solution Support networking and communication requirements in line with Owner security and IT network requirements
CxA101	2	0.84	Answer = 2 Design Professional
CxA102	2	0.84	Answer = 2 Architect / Engineering
CxA103	1	0.84	Answer = 1 Commissioning Test Demonstrations
CxA104	1	0.84	Answer = 1 Throughout the construction period
CxA105	1	0.84	Answer = 1 General Contractor
CxA106	1	0.84	Answer = 1 TRUE Before deciding on a complete redesign and renovation, an owner may elect to implement recommissioning, which might solve problems with less expense than replacement.
CxA107	1	0.84	Answer = 1 One component to another throughout the entire system
CxA108	1	0.84	Answer = 1 Design Intent Document - DID
CxA109	4	0.84	Answer = 4 Testing contractor
CxA110	2	0.84	Answer = 2 Commissioning Authority
CxA111	2	0.84	Answer = 2 Commissioning Authority
CxA112	4	0.84	Answer = 4 Owner Representative / Owner
CxA113	2	0.84	Answer = 2 Design Professional - DP
CxA114	1	0.84	Answer = 1 Final Acceptance
CxA115	3	0.84	Answer = 3 General Contractor
CxA116	1	0.84	Answer = 1 Actually occur
CxA117	1	0.84	Answer = 1 Future maintainability and operability

iPQ.No	Correct Answer	Points	Explanation
CxA118	4	0.84	Answer = 4 All of the above
CxA119	1	0.84	Answer = 1 Commissioning is more of a procedure than a one-time event.
CxA120	2	0.84	Answer = 2 Commissioning Authority